Masterarbeit

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Thema: Development of an evaluation methodology to analyze the tooling industry in international markets and its validation on the Spanish market

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Master's Thesis

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Topic: Development of an evaluation methodology to analyze the tooling industry in international markets and its validation on the Spanish market

The tooling industry takes a key role in the value chain of the manufacturing industry. It is the enabler of a powerful production and represents the link between product development and series production. Due to the increasing globalization and the associated growing number of competitors the competition has intensified. Toolmaking companies from high wages countries are therefore forced to use the potential of the markets with lower factor costs. The relocation of production volumes in these regions rarely leads to the desired results: Strong variations in quality and unsatisfactory delivery dates are typical challenges that interfere significantly the production process. These obstacles are reducible to an insufficient Market Intelligence. To ensure a successful tool supply in new markets toolmaking companies need sufficient transparency to important market-specific information, as this is the basis of operational and strategic decisions.

The aim of this thesis is to develop an evaluation method for the analysis of international markets and to validate its functionality and performance by applying it to the Spanish market.

Specifically, the following tasks have to be solved:

- Research on the theme of Market Intelligence and its current state of art
- Identification of specific requirements of the toolmaking industry
- Development of an evaluation method for the analysis of international markets
- Validation of the evaluation method on the example of the Spanish market
- Evaluation of the performance of the main Spanish toolmaking companies

The results of this work are meant to be derived in a scientific manner and comprehensively documented.

Chair Holder

Prof. Dr.-Ing. Dipl.-Wirt. Ing. Günther Schuh
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<td>BoP</td>
<td>Balance of Payments</td>
</tr>
<tr>
<td>CAD</td>
<td>Computer Aided Design</td>
</tr>
<tr>
<td>CAE</td>
<td>Computer Aided Engineering</td>
</tr>
<tr>
<td>CAM</td>
<td>Computer Aided Manufacturing</td>
</tr>
<tr>
<td>CNC</td>
<td>Computer Numerical Control</td>
</tr>
<tr>
<td>CPI</td>
<td>Consumer Price Index</td>
</tr>
<tr>
<td>DBMS</td>
<td>Database Management System</td>
</tr>
<tr>
<td>ECB</td>
<td>European Central Bank</td>
</tr>
<tr>
<td>FEAMMM</td>
<td>Federación Española de Asociaciones Empresariales de Moldistas y Matriceros</td>
</tr>
<tr>
<td>GCI</td>
<td>Global Competitiveness Index</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GIA</td>
<td>Global Intelligence Alliance</td>
</tr>
<tr>
<td>GNI</td>
<td>Gross National Income</td>
</tr>
<tr>
<td>ICT</td>
<td>Instituto Nacional de Estadística</td>
</tr>
<tr>
<td>INE</td>
<td>Information and Communication Technology</td>
</tr>
<tr>
<td>MI</td>
<td>Market Intelligence</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>OEM</td>
<td>Original Equipment Manufacturer</td>
</tr>
<tr>
<td>PDM</td>
<td>Product Data Management</td>
</tr>
<tr>
<td>PPP</td>
<td>Purchasing Power Parity</td>
</tr>
<tr>
<td>PPS</td>
<td>Production Planning and Scheduling</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
</tr>
<tr>
<td>SME</td>
<td>Small and Medium-sized Enterprises</td>
</tr>
<tr>
<td>USD</td>
<td>United States Dollars</td>
</tr>
<tr>
<td>WB</td>
<td>World Bank</td>
</tr>
<tr>
<td>WGI</td>
<td>Worldwide Governance Indicators</td>
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<tr>
<td>WTO</td>
<td>World Trade Organization</td>
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</table>
1 Introduction

The Tooling industry takes the product creation process to a key position between product development and series production. Through the provision of tools and moulds, it is the central enabler of an efficient mass production of standard products.¹

Due to the increasing globalization and the associated increase in the number of competitors, the competitive situation has worsened. Tool making companies from high rents countries are forced to use the potential of markets with lower factor costs. The joint of markets in networks is a sourcing strategy that rarely leads to the desired results: Strong variations in quality and unsatisfactory on-time deliveries are typical challenges that, due to the described role of Tooling, severely disrupt the production process.

These challenges come from an insufficient Market Intelligence application. Market Intelligence is all the information and relationships of a given market which are relevant for a company. Therefore, it offers the basis for business decisions.

To ensure a successful tool supply in new markets, Tooling companies need a sufficient transparency of the most important market-specific information to use it as the basis of operational and strategic decisions.

The aim of this work is the systematic evaluation of markets. At the same time, it presents those industry-specific factors of Tooling which must be taken into account, making an special approach into the evaluation of the level of Market Intelligence achieved by such industry. The structure of the thesis is represented in the next figure (see Figure 1)

This thesis gives an approach to the concept of Market Intelligence and its current development state with some highlights in the latest research findings. Also it will provide an evaluation method to analyse international markets and extract their useful information for the Tooling Industry. Finally it will give proof of the reliability of the described method by the study of a given market, the Spanish market, and the examination of the most outstanding Tooling companies.

¹ Capgemini Consulting (2014): Digital Value Network in the Tool Manufacturing Industry, pg. 4
Figure 1 Structure of the thesis
2 Basics

This chapter will provide the reader the information needed to understand the topics conducted in this thesis. The developed concepts are defined in this section accompanied with figures and explanations that will help to visualize the concrete ideas in the overall context of the thesis.

The chapter is divided in three sections. The first one enables the reader to understand the basics on Market Analysis followed through the study of a country. The second provides information of the current state of the Tooling Industry sector and its last trends. In the last section, a complete definition of the Market Intelligence tool is presented, also with an explanation of its benefits and the maturity stages that it can reach inside the company.

2.1 Market Analysis Basics

Country analysis involves the examination and interpretation of a nation’s economic, social and political environment. It aims to study the country as the landscape where the industrial activity is developed. It must be remembered that the country provides resources to the businesses but also determines the rules that they must follow in each stage of the economic activity.

The analysis will offer a comprehensive overview of a country that allows a better comprehension of its industry structure and performance, which is critical to the local businesses. When a company or institution knows its competitive environment, it finds easier making predictions and guessing the next movement in the national market behaviour.

This section proposes a group of social, economic and political performance indicators, which will be used in the following chapter to make an utterly country analysis, and explains which information can be extracted from them.

The structure followed divides this section in 5 parts depending on the angle of study: Governance, Economical Performance, Culture, Knowledge and Technological Resources, and International Trade. As a complement to this 5-approach-study, a special analysis called LoNGPEST will be performed to procure the last-minute information to the reader.
2.1.1 Political, Economic, Social and Technological analysis

Markets are constantly influenced by external factors and forces. These influences are defined as the external environment of a market and modify the behaviour of the companies of such market. That occurs because it is directly connected to their competitive situation. On doing an analysis of these forces, it is possible to classify these factors in 4 main categories:

- **Political**: All activity which has an effect on a company and is performed by a government (local or national) must be placed in this category. The international alliances and agreements, in addition to the international bodies’ activity, are also present in this space. Besides laws and taxes, regulations on the private sector and trading have a huge impact on the company performance in a particular market. From another point of view, public sector services could make easier the access to some resources needed for the business activity.

- **Economic**: The aspects that can be found in this space define how easy is for a company to finance its activities and the fluentness of money in a market: the relationship of a company with its bank, the state of the country economy and the labour market. It must as well be taken into account the interest rates and the international trading conditions if the object of the study is an international market. For European markets, the World Trade Organisation (WTO) and the European Union play a significant role in this part.

- **Sociocultural**: Includes the local community and its relationship with the company, as well as the social capital, the signs or properties owned by a social group that can bring them together or tear them apart. Demographic trends and social changes imply adjustment in the business strategies followed by companies to adapt to the new social structures and communities behaviours. Global companies will find useful to analyse cross-cultural issues such as language, behaviour or culture shock.

- **Technological**: Developments on technology can completely transform the structure of a company. Use of increasingly sophisticated hardware and software, new telecommunications methods and improved access to information varies companies’ capacity and efficiency.

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drastically. This part of the analysis must observe how easy is for a company to access these technologies and apply them into the market.

This type of approach is known by the name of PEST\(^7\) analysis and is commonly used between companies and investors to study the actors and their interactions with the competitive environment in a particular market. In order to understand effectively the environment, it is highly recommended to complement the information of this classification ordering each influence in function of the level at which it occur\(^8\).

- Local level: it is referred as the most immediate location where a company operates, such as its town, city or region.
- National level: the home country where the company has got its headquarters.
- Global level: all parts of the world where the company is present.

This two-dimensional analysis is resumed in the next figure (see Figure 2) and it is called LoNGPEST from the combination of the levels Local, National, Global and the Political, Economic, Social and Technological analysis:

Another possible variant is the PESTLE\(^9\) approach. This version incorporates two more points of view, the Legal and the Environmental, to the typical PEST study. However the LoNGPEST has the advantage of separating each action on levels and, by doing so, it gives more accurate information of the responsible authors of each one. Also, the legal and environmental considerations can be positioned either in the Political, Economic or Sociocultural part. For all these reasons, in this study is conducted a LoNGPEST.

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\(^7\) Businessballs (2015): PEST market analysis tool
\(^8\) Capon, C. (2009): Understanding the Business Environment, pg. 6
\(^9\) PESTLE Analysis (2015): What is PESTLE analysis?
<table>
<thead>
<tr>
<th>Political</th>
<th>Economic</th>
<th>Sociocultural</th>
<th>Technological</th>
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<tbody>
<tr>
<td><strong>Local</strong></td>
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<tr>
<td>Local government (Comunidades autónomas)</td>
<td>Local bank branches</td>
<td>Local community Social capital</td>
<td>Communications technology:</td>
</tr>
<tr>
<td>Local offices of national government</td>
<td>Local economy</td>
<td></td>
<td>• Mobile phones and faxes</td>
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<td>Local associations</td>
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<td>• Video conferencing</td>
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<td></td>
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<td></td>
<td>• Internet and world wide web</td>
</tr>
<tr>
<td><strong>National</strong></td>
<td>National government</td>
<td>Central bank:</td>
<td>Demographic change</td>
</tr>
<tr>
<td>National bodies:</td>
<td>Stock market:</td>
<td></td>
<td>Social change</td>
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<tr>
<td>• Employers’ bodies</td>
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<td></td>
<td></td>
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<tr>
<td>• Employees’ bodies</td>
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<td></td>
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<tr>
<td><strong>Global</strong></td>
<td>Alliances and agreements:</td>
<td>Trading blocks and bodies:</td>
<td>Global demographics</td>
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<td></td>
<td></td>
<td>• EU</td>
<td>Cross-cultural issues:</td>
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<td>• OECD</td>
<td>• Language</td>
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<td></td>
<td></td>
<td>World money markets</td>
<td>• Behaviour</td>
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<tr>
<td></td>
<td></td>
<td>WTO</td>
<td>• Culture shock</td>
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</table>

Figure 2 LoNGPEST grid for Spain\(^\text{10}\)

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2.1.2 Evaluating Governance

The economic landscape of a country is not simply a product of ‘free markets’, but also involves the role of the state in all its forms and functions. Typically governments can interact directly with the market and the economic environment in two ways.

One way a government can shape the economic environment is through the creation and enforcement of a legal system. Laws and regulations may both constrain the behaviour and protect some companies from other parties depending on the country’s interests.

Another way is through its fiscal policy, which is the way how governments collect and spend their money, and the monetary policy, in the case of Europe, this one is decided by the European Central Bank (ECB).

These political figures or institutions that have, in some way, the responsibility of taking decisions that affect a whole country is what we understand as governance. According to the World Bank (WB):

“Governance consists of the traditions and institutions by which authority in a country is exercised. This includes the process by which governments are selected, monitored and replaced; the capacity of the government to effectively formulate and implement sound policies; and the respect of citizens and the state for the institutions that govern economic and social interactions among them.”

The impact of governance in a country performance is out of discussion. One study conducted by RODRIK, SUMBRAMANIAN and TREBBI found that institutions were more influential in determining growth per capita incomes than two traditional causes: geography or international trade. In fact, they found that improving the quality of institutions by one standard deviation led to a six-fold increase in per capita incomes.

The following section is composed of widely used indices of government performance that will be used during the country analysis and explains which information can be extracted from them.

**Worldwide Governance Indicators**\(^{13}\) (WGI): The WB initiated in the mid-1990 a methodology to evaluate country governance based on the analysis of data obtained from different sources (surveys of households and firms, commercial business information providers, non-governmental organizations, and public sector organizations). The six broad dimensions reported on these indicators are:

- Voice and Accountability, it captures perceptions of the extent to which a country’s citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.

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\(^{11}\) World Bank (2015): Governance definition


\(^{13}\) World Bank (2015): Worldwide Governance Indicators
• Political Stability and Absence of Violence, it measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism.
• Government Effectiveness, it captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government’s commitment to such policies.
• Regulatory Quality, it captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.
• Rule of Law, it captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.
• Control of Corruption, it captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.

Global Competitiveness Index (GCI)\textsuperscript{14}: It defines the performance of a country in the different aspects of competitiveness captured in 12 pillars. In this index, competitiveness is defined as the set of institutions, policies and factors that determine the level of productivity of a country (see Figure 3).

The pillar named as ‘Institutions’ is the one who evaluates the governance of the country but also it is possible to use the ‘Macroeconomic environment’ punctuation to get an impression of the fiscal policy performance of that country.

\textsuperscript{14} World Economic Forum (2015): Global Competitiveness Report
At the moment of evaluating the fiscal policy of a country, there are some economic indicators that can be easily calculated and allow the possibility of doing a quantitative analysis, besides permitting comparison between countries.\textsuperscript{16}

- Government spending ratio, gives an idea of the impact of a government in the country economy (even though it does not reflect the impact of laws or regulations).

\[
Government\ spending\ ratio = \frac{\text{Total government spending}}{\text{GDP}} \tag{1}
\]

- Budget deficit ratio and debt ratio, reflect government’s ability on spending within the tax revenues it generates.

\[
Budget\ deficit\ ratio = \frac{\text{Budget surplus (deficit)}}{\text{GDP}} \tag{2}
\]

\textsuperscript{15} World Economic Forum (2015): Global Competiveness Report

\[ Debt\ ratio = \frac{National\ debt}{GDP} \quad (3) \]

- Debt to Gross National Income ratio, allows comparison between the money which away from the country, in form of debt, and the money which flows into it, in form of imports.

\[ External\ debt\ to\ GNI\ ratio = \frac{External\ debt}{Gross\ National\ Income} \quad (4) \]

2.1.3 Evaluating Economical Performance

The economic environment of a country is often drawn from the close examination of some economic variables and their behaviour over time. Indicators used frequently to measure a country’s welfare include Gross Domestic Product (GDP), inflation, unemployment, criminality, and interest rates.

2.1.3.1 GDP and Inflation rate

The definition of the Organisation for Economic Co-operation and Development (OECD) is one of the most complete and detailed that can be founded:

“\textit{Gross domestic product (GDP) at market prices is the expenditure on final goods and services minus imports: final consumption expenditures, gross capital formation, and exports less imports.}"

‘\textit{Gross’ signifies that no deduction has been made for the depreciation of machinery, buildings and other capital products used in production. ‘Domestic’ means that it is production by the resident institutional units of the country. The products refer to final goods and services, that is, those that are purchased, imputed or otherwise, as: final consumption of households, non-profit institutions serving households and government; fixed assets; and exports (minus imports).}"

\textit{Data are internationally comparable by following the System of National Accounts. This indicator is measured in USD per capita (GDP per capita) and in million USD at current prices and PPPs.}” \textsuperscript{17}

The formula used to calculate it:

\[ GDP = Consumption + Private\ Investment + Government\ spending + Exports - Imports \quad (5) \]

Although this indicator can be calculated with little effort, it is often defined as a complex indicator\textsuperscript{18} because it does not reflect some essential information about a country economy\textsuperscript{19} and, if not properly analysed, it can provide misleading information:

\textsuperscript{17} OECD (2015): GDP definition
Most glaringly, GDP does not capture the distribution of growth and, as a result, cannot reflect inequality. GDP cannot distinguish between a positive economic indicator, like increased spending due to more disposable income, and a negative economic indicator, like increased spending on credit cards due to loss of wages or declining real value of wages. GDP also does not capture the value added by volunteer work or the value of caring for one’s own children. Neither does with the value of the country’s natural capital.

For the purpose of this thesis, the GDP is a reasonable good measure for the output of goods and services that are the basis of an economy and allows a qualitative evaluation of the economic health of a country. When an economy is growing, its GDP is increasing, businesses are selling more goods and services, and people are earning higher incomes.

The information provided by the GDP has no worth without a display of the general level of prices of a country is not provided. Price indexes\(^\text{20}\) are indicators that go up and down depending on the prices of a variety of goods and services. An increase in prices as measured by the price index is called inflation; a decrease is deflation.

The GDP deflator is the index that measures prices for all goods and services. It is also known as inflation rate. The formula used to calculate the deflator is:

\[
 GDP\ deflator = \frac{Nominal\ GDP}{Real\ GDP} \times 100
\]  

The nominal GDP of a given year is computed using that year’s prices, while the real GDP of that year is computed using the base year’s prices.

The other most used price index is the Consumer Price Index (CPI), which measures the value of a basket of goods and services that are purchased by consumers. First, the CPI is calculated for each item of the basket and then given a weight in order to get a weighted average, which will be the actual CPI for the entire basket. The formulas:

\[
 CPI_{\text{item}} = \frac{\text{updated cost}}{\text{base period cost}} \times 100
\]  

\[
 CPI = \sum_{i=1}^{n} CPI_{i} \times \text{weight}_{i}
\]

where the weights sum to 1 or 100.

---

\(^{18}\) An explanation of each of the categories that compose the GDP in Currie, D. M. (2011): Country Analysis, pg.17, 18

\(^{19}\) Demos (2015): GDP lacks

As the reader has possibly guessed, inflation is more than a measurement problem. Inflation, particularly unexpected inflation, distorts decisions by consumers and business executives. It introduces uncertainty into decisions about investing or consuming because prices are distorted and prices convey a multitude of information in a market economy.

Inflation also promotes social unrest. People begin to point fingers at others they believe are taking advantage by raising prices: corporations, suppliers, bankers… That is why governments always keep an eye on this indicator.

Also the GDP deflator helps to obtain the Real GDP, whose difference with the Nominal GDP is that the effect of inflation has been eliminated. This is the reason why GDP must be always presented with the inflation rate, else the information it provides could be misleading.

These indicators are often used in per capita figures to show, not how the country economy is performing, but how individuals within the country are doing. But even this way is not a fair description of the distribution of wealth along the population; this problem will be solved in the last part of this section.

2.1.3.2 Unemployment and Criminality

The economy of a country is highly conditioned from two social factors: unemployment\(^{21}\) and criminality\(^ {22}\) levels. Unemployment is formally defined by the International Labour Organization as:

\[
\text{“Those individuals who are currently not working but are willing and able to work for pay, currently available to work, and have actively searched for work.”}^{23}
\]

The effects of unemployment on the economy are suffered by the unemployed but also by the government and even by the whole society. On one hand, the government is forced to help the unemployed with some services such as access-to-labour-market courses or paying them a minimum amount of money during this transactional period in which the beneficiary is supposed to search for a job. This unemployment financial costs, added to the lost income and decreased production, have a huge negative impact in the country economy. On the other hand, an unemployed person and his/her family would rather save than spend their money, which in turn affects the economy adversely. This loss of spending power does not only mean a decrease on the consumption of goods and services but it is also translated into social unrest and tension on the remaining taskforce.

Criminality is another factor to consider. Crime not only affects economic productivity when victims miss work or through the loss of tourism and retail sales. The feeling of security is radically important for attracting investors and labour force.

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\(^{21}\) Academia (2015): Consequences of Unemployment in World Economies


\(^{23}\) International Labour Organization (2015): Unemployment definition
Communities and governments spend public funds for police departments, prisons and jails, courts, and treatment programs, including the salaries of prosecutors, judges, public defenders, social workers, security guards, and probation officers. The amount of time spent by victims, offenders, their families, and juries during court trials also is taken away from country productivity. And even with all these efforts, sometimes, is almost impossible for a country to recover an image of a nice place to visit or doing business.

2.1.3.3 Interest Rates

An interest rate is the rate at which interest is paid by borrowers (debtors) for the use of money that they borrow from lenders (creditors). Specifically, the interest rate is a percentage of principal paid a certain number of times per period for all periods during the total term of the loan or credit. Interest rates are normally expressed as a percentage of the principal for a period of one year; sometimes they are expressed for different periods like for a month or a day.

Interest-rate targets are a vital tool of monetary policy and are taken into account when dealing with variables like investment, inflation, and unemployment. The central banks of countries generally tend to reduce interest rates when they wish to increase investment and consumption in the country's economy. However, a low interest rate as a macro-economic policy can be risky and may lead to the creation of an economic bubble, in which large amounts of investments are poured into the real-estate market and stock market. Higher interest rates increase the cost of borrowing which can reduce investment and output and increase unemployment. Expanding businesses, especially entrepreneurs tend to be net debtors. In developed economies, interest-rate adjustments are thus made to keep inflation within a target range for the health of economic activities or cap the interest rate concurrently with economic growth to safeguard economic momentum. Higher rates encourage more saving and reduce inflation.24

2.1.3.4 Other economic indicators

When the country provides the sufficient resources to its industry, it grows faster because it is easier for the enterprises to develop their economic activities and produce goods and services. These primary resources are known as capacity of a country. There are two good measures to determine the capacity of a country, though, the **primary energy cost** and the **transport infrastructure**. Both of them become critical especially in industrial activities such as manufacturing and construction.

It is time to treat another point. As it was previously announced, the GDP does not reflect the income distribution and the other economic indicators, neither. But actually, there is a widely

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accepted indicator used to measure the inequality of income in a country: the Gini Coefficient.

The **Gini Coefficient**\(^{25}\) measures income distribution by comparing how much income shares for each segment of the population deviate from what the shares would be if incomes were distributed equally. If incomes are distributed equally, the Gini Coefficient is 0 because there is no deviation. If incomes are distributed unequally, the Gini Coefficient has a maximum value of 1. Usually this indicator is multiplied by 100 and the result is the Gini Index.

Another characteristic of the country which influences its economic performance is its level of freedom, so the individuals can make their own choices and shape the market without limitations. This means that the competition between individuals is fair and, as a consequence, they search to be competitive among the others.

The **Index of Economic Freedom**\(^{26}\) has a bias toward countries whose population is free to make economic decisions, even if they do not have equal political freedom. Surprisingly, the economic success is not directly related to the political system of countries.

To reflect the influence of the government in the freedom of individuals to make political decisions, the index named as **Freedom in the World**\(^{27}\) is one of the most typical.

And finally, there is another useful indicator that provides information about the ability of a country to enhance or constrain investment, productivity and growth: **Doing Business Index**\(^{28}\).

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\(^{27}\) Currie, D. M. (2011): Country Analysis, pg. 73

2.1.4 Evaluating Culture

From a market analysis perspective, culture determines peoples’ attitudes and the institutions people create to perpetuate culture. When experts study a country culture and try to compare it with others, they realise there is no good or bad associated with the dimensions they use to evaluate it; they only describe a culture.

Geert Hofstede measured culture according to five dimensions that allow the comparison between cultures and permit to business executives know if their company structure and their marketing strategy fit in the country’s culture referents. In the GLOBE program, these five dimensions were decomposed to provide a more understandably lecture and related to measures of a country’s economic status, such as income, productivity, and human wellbeing. This report also differentiates between values, what people think is more praiseworthy, what their behaviour should be, and practices, how people actually behave. These nine dimensions’ study represents, right now, the most comprehensive approach to culture yet (see Figure 4).

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Distance</td>
<td>The degree to which members of a collective expect power to be distributed equally.</td>
</tr>
<tr>
<td>Uncertainty Avoidance</td>
<td>The extent to which a society, organization, or group relies on social norms, rules, and procedures to alleviate unpredictability of future events.</td>
</tr>
<tr>
<td>Humane Orientation</td>
<td>The degree to which a collective encourages and rewards individuals for being fair, altruistic, generous, caring and kind to others.</td>
</tr>
<tr>
<td>Collectivism I (Institutional)</td>
<td>The degree to which organizational and societal institutional practices encourage and reward collective distribution of resources and collective action.</td>
</tr>
<tr>
<td>Collectivism II (In-Group)</td>
<td>The degree to which individuals express pride, loyalty, and cohesiveness in their organizations or families.</td>
</tr>
<tr>
<td>Assertiveness</td>
<td>The degree to which individuals are assertive, confrontational and aggressive in their relationships with others.</td>
</tr>
<tr>
<td>Gender Egalitarianism</td>
<td>The degree to which a collective minimizes gender inequality.</td>
</tr>
<tr>
<td>Future Orientation</td>
<td>The extent to which individuals engage in future-oriented behaviours such as delaying gratification, planning, and investing in the future.</td>
</tr>
<tr>
<td>Performance Orientation</td>
<td>The degree to which a collective encourages and rewards group members for performance improvement and excellence.</td>
</tr>
</tbody>
</table>

Figure 4 Nine GLOBE’s dimensions of culture

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29 Grovewell (2015): GLOBE program
30 Grovewell (2015): GLOBE dimensions
31 GLOBE (2015): Characteristics of the study
2.1.5 **Evaluating Knowledge and Technological Resources**

Technological advances and the ease to their access are key success requirements that a country must accomplish if its expectations are that national companies have a competitive advantage against foreign companies. When information flows adequately, analysis and predictions are carried on, granting a better knowledge of the competitive environment and supporting business decisions. Then, technology and information treatment become determining factors of a country performance and define its competitive capacity.

The commitment of a country into developing its own knowledge and technology is often represented by the percentage of the GDP that is invested in R&D. However, there are other indicators that can give information about the technological level reached by a country and its ability into make technology reachable to individuals. In the GCI (explained in section 2.1.3) this two categories are found under the names ‘Innovation’ and ‘Technological readiness’, respectively.

The technological readiness pillar measures the agility with which an economy adopts existing technologies to enhance the productivity of its industries, with specific emphasis on its capacity to fully leverage information and communication technologies (ICTs) in daily activities and production processes for increased efficiency and enabling innovation for competitiveness. It is important to note that, in this context, the level of technology available to firms in a country needs to be distinguished from the country’s ability to conduct blue-sky research and develop new technologies for innovation that expand the frontiers of knowledge.

Technological innovations have been at the basis of many of the productivity gains that our economies have historically experienced. Innovation is particularly important for economies as they approach the frontiers of knowledge, and the possibility of generating more value by merely integrating and adapting exogenous technologies tends to disappear. Firms in these countries must design and develop cutting-edge products and processes to maintain a competitive edge and move toward even higher value-added activities. This progression requires an environment that is conducive to innovative activity and supported by both the public and the private sectors. In particular, it means sufficient investment in research and development (R&D), especially by the private sector; the presence of high-quality scientific research institutions that can generate the basic knowledge needed to build the new technologies; extensive collaboration in research and technological developments between universities and industry; and the protection of intellectual property, in addition to high levels of competition and access to venture capital and financing that are analysed in other pillars of the Index.
2.1.6 **Evaluating International Trade**

When deciding which indicator can explain more precisely the ability of compete in the international market and obtain benefits, one should take a look in the Balance of Payments (BoP) risk indexes such as the current account ratio and the debt service ratio.

The BoP is defined by Herbert Stein as:

"The balance-of-payments accounts of a country record the payments and receipts of the residents of the country in their transactions with residents of other countries. If all transactions are included, the payments and receipts of each country are, and must be, equal. Any apparent inequality simply leaves one country acquiring assets in the others."  

Although the totals of payments and receipts are necessarily equal, there will be inequalities (excesses of payments or receipts, called deficits or surpluses) in particular kinds of transactions.

The BoP is divided into five accounts:

- The Current Account, which focuses mainly in trade activities such as exports and imports of goods and services. Other activities included: income received and paid, and current transfers.
- The Capital Account, which records special transfers and accounting adjustments.
- The Financial Account, which focuses on investment activities and the means of payment for the exports and imports from the Current Account.
- Errors and Omissions, brings the BoP into Balance.
- Reserve Account, which measures the variation of the reserves of a country resulting from the flows in the other accounts.

Because the current account and the capital account add up to the total account, which is necessarily balanced, a deficit in the current account is always accompanied by an equal surplus in the capital account, and vice versa. A deficit or surplus in the current account cannot be explained or evaluated without simultaneous explanation and evaluation of an equal surplus or deficit in the capital account.

A country is more likely to have a deficit in its current account the higher its price level, the higher its gross national product, the higher its interest rates, the lower its barriers to imports, and the more attractive its investment opportunities—all compared with conditions in other countries—and the higher its exchange rate.

Contrary to the general perception, the existence of a current account deficit is not in itself a sign of bad economic policy or bad economic conditions. If the United States has a current account deficit, all what this means is that the United States is importing capital. And

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importing capital is no more unnatural or dangerous than importing coffee. It may be a problem, but it is in the underlying conditions and not in the deficit per se.

In order to evaluate the BoP risk, the most frequently used measures are the Current Account ratio, if the ratio decreases over time it would mean a country experiences financial difficulties, and the debt service ratio, which compares the country’s debt service to its exports of goods and services. Debt service consists on the principal and interest payments that the country makes on its external debt. A lower debt service ratio indicates that a country does not have much debt service relative to its ability to generate the means of the payment.

\[
\text{Current account ratio} = \frac{\text{Current account surplus (deficit)}}{\text{GDP}} \quad (9)
\]

\[
\text{Debt service ratio} = \frac{\text{debt service}}{\text{exports of goods and services}} \quad (10)
\]

---

2.2 Tooling Industry

This chapter revises the concepts related to the study of the Tooling industry. This section starts giving a definition of what we understand as tool and of the Tooling Industry itself. Then, it will present some characteristics of this industry in Europe and how has it modified its business strategies along time in order to adapt to the always changing economic environment. Finally it makes an approach on the latest trends and business opportunities the toolmakers are moving towards.

2.2.1 Definition

Tools are present in the design and manufacturing of almost all industrial products from aeronautics and automotive, to electronics, household, equipment goods and micro-devices.\(^ {35}\) Present in the production process as final parts (products and components) or as production equipment (such as, machine-tools), the Tooling Industry is in the core of the production system of final products, determining its value, efficiency and robustness. Moreover, this manufacturing industrial area is critical in innovation processes. It is involved in the critical path of any new product development, determining largely the time to market. Product innovation, technological development and the optimization of the whole manufacturing system strongly depends on innovations and developments on Tools. Their cost and time to market as well as their quality and horizontal strategic have an effect on the sustainability of the European industrial competitiveness.\(^ {36}\)

This statement is not only true for the European manufacturing market but for every single market which level of industrial development enables itself to compete in the global trading market and, with this economic activity, obtaining benefits.

Tooling Industry refers to that area of the manufacturing sector which is dedicated to produce working or manufacturing aids such as cutting tools, dies, fixtures, gauges, jigs, moulds, and patterns of a specialized nature which (unless substantially altered or modified) are limited in use to a specific production line or the performance of a specific task or job. The next figure provides a summary of the main tool groups this industry produces classified by its working method and the material they transform (see Figure 5):

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“As an independent business area, the Tooling Industry emerged in industrialised countries at the beginning of the 20th century and has grown in relevance ever since. Injection moulds for plastics developed as an offshoot of the glass industry which used specialised labour for the production of moulds for glass forming. After World War II, industrialised regions developed their own industrial tooling base which consisted of departments within large companies using tools and small and medium-sized companies specializing in a particular type of tool, defined mainly by the technology used to produce the final parts.”\(^{38}\)

However, tool import/export has grown considerably over the years and international trade has become such a repetitive topic in this manufacturing area that now we can talk about a globalisation of the Tooling Industry.

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2.2.2  **State of Art: Current situation**

The Tooling sector has progressed by leaps and bounds since the turn of the millennium. Technological advancements on manufacturing processes and the development of more powerful software have shifted the conditions of small and big companies. Also the socioeconomic changes have affected this Industry: Asian standard low cost products compete with European higher added value tools in a new global market.\(^{39}\)

2.2.2.1  **Paradigms shift**

From the second half of the last century until the present days, the market and competitive conditions of the manufacturing industry have been experiencing continuous changes. The accessibility to new technologies, the cost and availability of labour, and the active legal regulations have led to an evolution of the industrial organisations.

After the 2\(^{nd}\) World War, to meet the growing demand, the manufacturing sector considered the mass production method, grounded on labour division and simplification, the key factor to reach a competitive business status. Nowadays, the concept has advanced and industrial organisations focus its efforts on developing a mass-customized production centred on innovative and differentiated products and in which knowledge, technology and production flexibility play a significant role.

The disadvantages of the mass production method are its inflexibility and the lack of variety of its products. These disadvantages became evident with the market share loss of Ford to General Motors. The first one produced tremendous affordable output thanks to the mass production method but was not able to respond to the demand of variety, customization, or design changes. General Motors, on the contrary, introduced annual model changes, more accessories and a choice of colours in its products.

These arguments give us a reason for the latest trends in the European manufacturing industries. They move away from the business models based on physical resources and mass production of undifferentiated products towards higher added value and sustainable products, processes, services and business organisation.\(^{40}\)

2.2.2.2  **Presence in the European and global markets**

The European Tooling Industry (moulds, dies and special tools) has achieved an average annual turnover of 13 000 Million Euro. More than 7 000 companies, 95% of them being small and medium-sized enterprises (SMEs) conform this sector, which employs a high added value workforce (more than 100 000 workers directly in the sector) with a large experience and knowledge of the manufacturing process. Tools are increasing its complexity,


becoming almost unique products that require an intensive formation on engineering and production.\textsuperscript{41}

The Tooling Industry exploded in Europe thanks to the industrial spin-offs where highly dynamic family companies built their business on learning-by-doing and the entrepreneurship of their leaders and workers. A success key factor of this fragmented industry was the acquisition of large original equipment manufacturers (OEMs) and Second Tier Suppliers as main clients. This was especially relevant during the rapid global expansion period of companies in the 80s and the 90s.

Since then the development of a huge proportion of the Tooling Industry has been associated with the development of its own clients. Focused on the production of tools, this industry built client confidence on the basis of the quality (performance, reliability, durability…) of the product – tools.\textsuperscript{42}

But, in the last years, toolmakers have been confronted with a huge competition. This global phenomena, assumes competitive characteristics still never experienced. By one side, the migration of industrial companies that traditionally have been significant clients of tools (automotive, electronic equipment, consumer goods, to name a few) to regions with lower production costs, in particular to Far East countries, has decreased the local demand. The European Tooling Industry is heavily depending on these industries (they mean more than 70% of the portfolio of clients) and now faces the real risk of losing competitive arguments.

By the other side, in these same regions a high number of new tool-makers are entering the market, but they still present early development stages. Nevertheless, these new comers present a strong and global competitive potential. These facts, together with a downturn of the European growth rate, result in an excess capacity set up in the western economies and in strong competition based on price.\textsuperscript{43}

The Asian Tooling Industry has proved to be the winner in the price-based competition so the European tool-makers must prove themselves generating (and demonstrating) a higher added value by innovation. But this kind of innovation should not be considering only in the field of engineering, material and production technologies. It should be present in a new way to face the economic environment, in new business models that provides the basics to enter new though markets and operate and think globally, to handle new supply chains and networking partnerships, to recognize opportunities, to provide new added value services along life cycle and to provide tailored engineering solutions to the market perceived needs. One critical resource from which the European Tooling Industry must take profit is the knowledge and experience of its qualified work force, with learning capabilities and with an


entrepreneurship profile. This and the advanced technology that the sector already has are the competitive advantages of the European Tooling Industry. \(^{44}\)

2.2.2.3 Characteristics of Tooling companies

The Tooling industry is usually studied from 3 different approaches: the process, the product and the resources. If you put them altogether, you have a complete analysis of the industry of a country that defines the characteristics of the local companies.

**The process:** The design and manufacturing of tools (moulds and dies) is one of the most demanding engineering tasks for modern production technology. It requires a high qualified task force and it must be supported by external processes from specialized suppliers. Getting continuous data from this internal process and its analysis to obtain useful information is critical for the success of the Tooling Company. This information will be added to the company's knowledge and will lead to a constant optimisation of the process reflected in the production as a lesser time-to-market and in the product as a greater final quality.

Figure 6 shows a typical tool design and manufacturing cycle, starting with a request for a tool quotation and ending with part inspection and tool approval at the client shop, where the required engineering functions are analysed (see Figure 6). There are some stages of the process that take place at the same time rather than in a sequential order.

The first stage is formed by a pre-analysis of the product specifications. At this moment the toolmaker should take into account the production requirements its machinery must fulfil in order to be able to provide the tool to its client. Normally, the final product can be produced from a model part that would be the first input of the production stage and would give some initial perspective of the whole process. When this definition stage ends up, a design phase comes to life.

After detailed design, validation and acceptance by the client, the materials are ordered and the tool construction process is started. Depending on the tool complexity, the construction relies in a combination of machining processes, essentially milling, drilling, grinding and electro-discharge machining, or some other of higher sophistication such as powder metallurgy compaction and sintering. A significant amount of time is required to obtain a suitable surface finish (frequently hand-polishing is necessary)

The last stages are final inspections, tool assembly and trials. Once the client does its own inspection and is satisfied with the final quality of the product, the tool process is ended. Although, it does not imply all work is over: process information analysis and process optimisation are continuously in a non-stop phase.

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\(^{44}\) Schuh, G. (2009): Toolmaking for the Future, pg. 10, and
Figure 6 Example of a tool making manufacturing process\textsuperscript{45}

New methods are on his way: The modern tooling factory requires the intensive use of advanced manufacturing applications and equipment which is increasingly based on information technologies. Automatisation and information analysis treatment are on the daily worksheet. In fact, applications such as computer aided design (CAD), engineering (CAE) and manufacturing (CAM) and numerically controlled machines are currently in widespread use, making easier the designing process and accelerating the manufacture of new parts. Although still at an early stage, product data management (PDM), database management (DBMS) as well as production planning and scheduling (PPS) systems are also being introduced throughout the industry.  

**The product:** A Tooling company must be able to construct products of high complexity and quality in order to meet the demand from the manufacturing Industry and remain competitive. Its clients expect a high performance of the tool because it is a central of the manufacturing process of any part or final product. The toolmaker must create products that fulfil really specific requirements and almost always these high performance parts get restrictive limitations of volume or weight. The typical products of the Tooling industry are dies and moulds but there is also a high demand of specialised tools that promotes that companies invest more in having a flexible process rather than augment its production capacity.

**The resources:** It is obvious that, for producing a high quality product, the tooling process will need some resources with the same level of excellence. The core resources in tooling are the employees. The Tooling Industry is not labour intensive but it demands a highly skilled task force. This high level of qualification between the employees is required to master all phases of the tooling process and being the most productive in each of them. This goal is only reached through continuous improvement and knowledge management to realize innovative and more effective tooling solutions.

Technology is another precious resource from the Tooling Industry. With high capacity utilization, efficient machines and automatisation permit to control the cost of tooling efficiently. Software-systems that are stringently organized in CAx-chains ensure the transfer of information and limit the potential for errors along the process. Each technological advance means a competitive advantage over the other companies so its rapid implementation is a critical task.

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2.2.2.4 Competitive environment

Tool making companies are small, between 10 and 100 employees, and, for that reason, most times are able to manage, supervise and control themselves efficiently. The lack of significant barriers between management and shop-floor improves communication and information flows effortlessly.

This company size becomes a problem when the toolmakers must deal with big clients and big suppliers, against which they have no sufficient negotiating power. The large multinational companies place their own rules on the Tooling market, worsening the situation of the tooling companies. Also this situation may derive into no planned costs when the toolmaker is enforced by the client to accept design changes, which suppose new design tools or new machinery.

The high-qualification-staff allows a smooth incorporation of new technologies. Even so, they are only few cases which mix different types of machinery in the same production unit. The main reason is because it needs different knowledge relating to design engineering; there is also a tendency to focus on what anchor clients want. Anchor clients and toolmakers use to have long-term relationships, facilitate a more focused evolution of competences and reduce the commercial and marketing effort needed to maintain business.

Qualified workers are synonym of long on-job learning/training periods and, due to the lack of these professionals in the European labour market, they are difficult to replace.

With the gradually increase of globalisation, every day more tooling companies know how to export their products and compete in foreign markets. The few companies that still do not follow this trend have focused on dealing with large local clients using the advantage of proximity.48

Some companies have achieved significant improvements in product manufacturing cost and robustness by working closely with clients on process or product designing.

A great disadvantage of the Tooling Industry is the rigid production capacity it has. For one side, the toolmakers cannot produce more if there is an overwhelming demand because the capital intensive structure has no more hours available to work and a new acquisition of new machinery and resources would imply a great investment for only a little period of time. On the other side, the toolmakers cannot produce less because the profitability of the business is quickly lost.

These advantages and disadvantages49 are reflected in the figure (see Figure 7):

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48 Baron, J. (2002): A Collaborative Business Model for the Tool and Die Industry, pg. 11, 12

## EUROPEAN TOOLING INDUSTRY

<table>
<thead>
<tr>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long business experience</td>
<td>Weak negotiating power with clients and suppliers</td>
</tr>
<tr>
<td>Strong technological background (expertise in a wide range of soft and hard manufacturing technologies)</td>
<td>Long production cycles and difficult payment conditions (extremely negative cash-flows difficult to accommodate within current capital structures)</td>
</tr>
<tr>
<td>Open attitude towards new technologies, particularly in production areas</td>
<td>Reduced number of clients (high dependency on anchor clients)</td>
</tr>
<tr>
<td>Strong and long-standing client relationships, particularly with anchor clients</td>
<td>Lack of qualified human resources particularly in management areas</td>
</tr>
<tr>
<td>No dependence on single clients</td>
<td>Difficulties in accommodating highly changing demand within a stable capacity</td>
</tr>
<tr>
<td>Experience in exporting</td>
<td>Lack of networking competences (tradition of self-sufficiency)</td>
</tr>
<tr>
<td>Framework capable of production on demand</td>
<td>Capital intensive business</td>
</tr>
<tr>
<td>Strong and resistant European tool market (automotive, aeronautics, electronics, medical…)</td>
<td>Weak strategy management and financial expertise (strategic focus often not clear)</td>
</tr>
<tr>
<td></td>
<td>Difficulties in dealing with crises and dramatic market changes (globalisation)</td>
</tr>
</tbody>
</table>

Figure 7 Strengths and weaknesses of European Tooling Industry\(^{50}\)

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2.2.3 **Trends and Opportunities**

The Tooling market is in a constant change and lately it has been overwhelmed by a huge amount of stimulus such as the economic crisis of 2008, the last technological advancements or the arise of the Far East industry.  

**New competitors**: A new wave of toolmakers is emerging in the Far East. At the moment, their lack of knowledge and experience obliges them to focus in low-cost productions. However, this young industry has some advantages that will help it to grow fast. First one, the Chinese government has provided tax incentives to attract foreign tool making investment and tariff exemptions on machinery. That added to lower labour wages and more working hours gives a great impulse to these new competitors and makes possible that they become a real threat to the European Tooling Industry.

**Reductions in demand**: Local European toolmakers reported a reduction in sales at the beginning of this century of between 20% and 40%. Part of this reduction can be related to a decrease in profit margins but the main cause that justifies this downturn is a lower demand for European tools.

The economic recession in Europe has left its mark in the European Tooling Industry and large companies have displaced its investment to the Eastern regions, delaying large product development programmes mainly focused in producing large amounts of tools. The new comers from the Far East have contributed to a larger supply of tools in the global market and the result is a market share loss from the European toolmakers.

**Client demands are becoming more stringent and more complex**: This is especially the case for tool lead times. Toolmakers are constantly asked for substantial reductions in lead times. They have already achieved reductions of 30% to 50% but the pressure remains. The reduction in product life cycles and the need to rapidly deliver new products to the market are the main drivers for tool lead time reduction. In contraposition, clients claim that toolmakers guarantee tool quality to meet strict requirements throughout the tool life cycle, something only really achievable if two main points are respected: correct tool operation and adequate maintenance procedures. In this moment the tool maker must form part of the manufacturing process in order to satisfy the client’s requests.

**Business opportunities**: The changes into the competitive environment have led not only to new threats and pressures but also to new opportunities of doing business under the new


   Schulz, B. (2014): European Tool & Mould Making Dec, pg. 6

53 Baron, J. (2002): A Collaborative Business Model for the Tool and Die Industry, pg. 34, and
   Schuh, G. (2009): Toolmaking for the Future, pg. 12, 26, 33, and
playing rules. These opportunities are mostly based in moving upstream or downstream the tool life cycle phases. The trend is to increase the added value and value perceived by the market of the tooling products.

- **More added value – vertical integration, integration of complementary services**

  Vertical integration is the extent to which a company controls its inputs and outputs and refers to the degree of integration between the company value chain and the value chain of its suppliers and clients. In the Tooling Industry it means the integration of some complementary areas of business with client spheres, from part design and prototypes, part production, tool maintenance and repairing services to large tool management programs (see Figure 8).

- **Global networking with clients, with partners and even with competitors**

  First, cooperation with clients allows a company to have a focused competence development, improving its productivity and efficiency. Secondly, partners’ collaboration means access to complementary competences and, finally, cooperation with competitors is difficult to achieve but it grants a reduction of risk in technological development and new markets approach. Also the possibility of deals improves the overall capacity of both companies to meet unpredicted market demand.

- **Efficiency and lean manufacturing applied to tool making**

  The meaning of lean manufacturing is: systematic approach to identify and eliminate waste (non-value-added activities) through continuous improvement by following customer driven product requirements in the pursuit of perfection. This technique enables cost and cycle times to be reduced, increases overall quality and efficiency and leads to a more competitive, agile market-responsive company.

- **New business areas – technical prototypes and very small series, tool maintenance on client site, tool end-of-life services...**

  The arise of differentiation is growing, specialisation in a specific demand grants less competition and a business strategy focused in a single product or a few of very similar characteristics.
Figure 8 New business opportunities\textsuperscript{54}

2.3 Market Intelligence

There is widespread agreement that firms must collect information about the competitive context within which they are operating in order to anticipate the profit implications of their strategic choices. Information about the attributes of a firm’s competitors as well as information about the resources and capabilities a firm brings to an industry are both important for anticipating the profit implications of a firm’s strategies. Market Intelligence goes a step forward and transforms all the collected information into practical knowledge on the reach of the decision-makers so they can react to changes adequately supporting its chosen strategies on a reliable background.

2.3.1 Definitions

Every organization which seeks to develop an economic activity is part of a value chain within which it has customers, potentially customers’ customers, different types of competitors, and suppliers. In a typical scenario, organizations also need to work with a number of interest groups, such as legislators, government bodies, and trade unions. These actors shape with their actions the competitive environment.

The individual market players alone stand a really complex background: some of the players are old and well established, others are emerging either with new business models or services, or they are simply entering the market as newcomers. In addition to providing different business models and substituting products and services, some of the market players may also be seeking growth by forming partnerships or integrating forwards or backwards along the value chain. Finally, the interest groups also bring about changes and developments in the marketplace that the organization needs to stay aware of.

The individual suppliers, competitors, and customers along the value chain make up clusters and industries, the dynamics of which the company will also need to understand. Knowledge comes to play a significant role and is almost plenty based on experience. To be able to maintain a forward-looking strategy, understanding the current and future developments, especially in the customer segments and industries, will be necessary for any organization. Technologies and business models in one industry easily also transfer over to the neighbouring one, generating trends which also mean new business opportunities.

Trends and megatrends, again, add to the complexity of the operating environment, as organizations should understand not only the obvious high level developments currently surrounding them but also those, potentially distant-looking, trends and megatrends that may cause surprises and/or generate threats and opportunities in the more far-reaching future.

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Finally, while some of the players and trends in the marketplace are truly global, for most organizations, each geographical area in which they have operations will introduce a distinct group of local suppliers, competitors, customers, and interest groups that will need to be understood both in the local business units and to some extent in the headquarters. Some trends of course may be local as well, further adding to the list of topics to be kept under radar.

In sum, the operating environment of a global organization is indeed complex; however, the elements in it can be arranged into a structured set of market players, industries, trends, and geographical areas. The list of topics may become very long though, and, to capitalize on the many opportunities for growth that the marketplace provides, the organization will need to put considerable effort into managing the information that will enable future-oriented decision-making.\(^\text{58}\)

Knowledge becomes a critical resource because it summarizes the experience of years of business activities and combines it with the latest up-to-date information and theoretical studies. Market Intelligence programs aim to do a proper management of this knowledge.

**Knowledge:** \(^\text{59}\) Schuh, Kuhlmann, Pitsch and Schippers define knowledge as a cross-linked information from which further knowledge can be derived. It must not be taken as synonym of information, which consists only of data. Information requires of interpretation but knowledge is the product of a person analysis on a previous data or knowledge. The knowledge owner is able to transfer part of it to another person or a kind of documentation. Therefore, knowledge exists in organisations within documents, databases or working routines.

**Market Intelligence (MI):** \(^\text{60}\) MI helps organizations understand their business environment, compete successfully in it, and grow as a result. As a program, MI collects information about market players and strategically relevant topics, and processes it into insights that support decision-making. This process requires a great analysis effort because of the complexity of the market players and their interactions. Organizationally, MI is typically placed under strategic planning, business development, or marketing.

**Fundamentals of MI as a program:** \(^\text{61}\) Processing business information into actionable insights that help organizations understand, compete, and grow in their market is a cyclical process. Within the cycle, a needs analysis always drives the process where data are collected and processed into analyses that will be utilized in decision-making. The MI

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\(^{58}\) Hedin, H., Hirvensalo, I., & Vaarnas, M. (2014): Handbook of Market Intelligence, pg. 5-8


\(^{60}\) Cornish, S. L. (1997): Strategies for the Acquisition of Market Intelligence and Implications for the Transferability of Information Inputs, pg. 2, 8, and


\(^{61}\) Hedin, H., Hirvensalo, I., & Vaarnas, M. (2014): Handbook of Market Intelligence, pg. 10
program affects the organisation not only in an information flow improvement but also in promoting a new working culture of sharing knowledge.

Decision-makers need MI both in the format of ad hoc projects and on a continuous basis. Ad hoc projects usually relate to very specific decision-making situations such as entering certain geographical market areas. Continuous market monitoring, in turn, is necessary for the organizations to maintain awareness about the current developments in the marketplace, for example, in the newly entered market area. Knowing what is happening in every moment can be as important as being able to make complex and completed data analysis in the long term.

2.3.2 Drivers and benefits

Better and Faster Decision-Making: Even though it is often hard to quantify its effect, an organized MI program improves the average quality of decisions made. Even not always granting the best choice, the well-treated information facilitates a proper interpretation of the situation and reduces the time between observation and action. When decision topics regularly go through a systematic process of research and analysis, the resulting decisions will be based on solidly grounded insights into aspects covering anything from the anticipated competitive response to compliance with the governing laws.

However insightful and well-grounded the decisions in an organization are, sometimes they are just made too late. One of the characteristics of an organization where the intelligence program is deeply rooted is the capability to react fast, that is, an ability to reach decisions quickly while its slower peers may still only be digesting the original surprise. The speedy process of course should not compromise the quality of the related analysis, which is the ground from where decisions are taken and for so must never be misleading or incorrect; again a reason to have an intelligence infrastructure in place that can handle rapidly emerging topics for research and analysis. Nevertheless, reliability is the real constant of the whole process.

Efficiency: time and cost savings: Almost every organization gathers and disseminates business information somehow, which brings us to the efficiency perspective: if time and resources will be put into collecting and analysing information in any case, it makes a big difference whether this process is organized and cost-efficient or not. There are processes that are almost the same but they are constantly repeated because they are carried out by different members of the organisation that do not know each other neither have access to

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each other’s information. These unnecessary efforts could be spared if the information of these processes was retained and then make it easily reachable for all the members.

Accurate information is needed to back up decisions, and without a systematically organized intelligence program, decision-makers repeatedly find themselves in situations where they have to dig for missing pieces of information. Over time, this collective search by executives becomes very expensive for the company, and organizing the MI program therefore yields measurable benefits in the form of liberating decision-makers from searching for to actually using information. Reducing the loss of time in information search augments the productivity of the executives and the related cost savings can be derived from the amount of expensive hours that executives save by always having the information they need at their fingertips when they need it.

Another form of very measurable benefits of MI is cost savings through optimizing the purchases and processing of information. A large organization easily spends millions of euros or dollars annually on different forms of business information, and several people may be analysing the same topics internally without knowing of each other’s efforts. Stopping this situation and granting the energy of the workers is spent in a useful way represents a huge impact in the overall company efficiency. If this activity is not centrally coordinated, overlaps are hard to avoid, and it may be that no one knows exactly how many budgets are being tapped into at different levels of the organization. Coordinating the purchases and processing of information therefore helps the organization to control the overall MI budget, to negotiate better deals with consultants and information vendors, and to eliminate redundancies.

**Organizational learning and new ideas:** Finally, the third category of MI benefits highlights the role of MI in facilitating the development of a shared understanding in the organization about its operating environment and in that way involving a large part of the organization in generating valuable new ideas. The company culture is changed into an open-minded knowledge share mentality.

Organizational learning and collective idea generation contribute to the eventual impact of MI on decision-making, but refer more to the process of constantly having potentially relevant topics for decision-making on the radar than to the actual decision-making itself. Having many years’ experience on the ground also contributes to the company’s ability to implement decisions rapidly, as the organization, being collectively aware of the developments in its business environment, is prepared for and even expects swift reactions from the decision-makers.

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2.3.3 Applying MI: Key success factors

The World Class MI Roadmap *Handbook of Market Intelligence* divides the MI development effort into six Key Success Factors, on one hand, and the levels of maturity that organizations typically go through with regards to each factor on the other. In this section an explanation of each factor is given:

2.3.3.1 Intelligence Scope

“Intelligence Scope” refers to defining the very purpose of the intelligence program, the user groups, and timeframe (past – present – future) of the intelligence activities, and the specific topics of which the user groups will need information on a regular basis. Topics under the intelligence scope typically include, e.g. customers, competitors, suppliers, trends, and geographical market areas.

Defining the scope of the intelligence program translates into conducting a needs analysis for the entire intelligence program: identifying the corporate functions that will be using the intelligence deliverables, and topics and themes that will be most relevant for each of them. Additionally, the degree of future orientation needs to be addressed; looking into the rear-view mirror is a good starting point. However, in a mature MI program, a great deal of time is

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spent on outlining possible future scenarios about the anticipated developments in the operating environment.

2.3.3.2 Intelligence Process\textsuperscript{67}

"Intelligence Process" refers to the gathering, analysis, and reporting of information to its user groups. The intelligence process should always be anchored to the existing corporate processes, such as strategic planning, marketing and sales, innovation and product management, as well as supply chain management (see Figure 10).

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{intelligence_process.png}
\caption{The Intelligence Process\textsuperscript{68}}
\end{figure}

2.3.3.3 Intelligence Deliverables\textsuperscript{69}

"Intelligence Deliverables" are the concrete output of the intelligence process. Deliverables may be tangible content products such as analysis reports, profiles, or market signals monitoring, or they can be interactive workshops and briefings. Deliverables may also include software tools designed to enable “self-service” usage of MI (see Figure 11).

\textsuperscript{67} Hedin, H., Hirvensalo, I., & Vaarnas, M. (2014): Handbook of Market Intelligence, pg. 77-86
\textsuperscript{68} Hedin, H., Hirvensalo, I., & Vaarnas, M. (2014): Handbook of Market Intelligence, pg. 77
\textsuperscript{69} Hedin, H., Hirvensalo, I., & Vaarnas, M. (2014): Handbook of Market Intelligence, pg. 87-100
2.3.3.4 Intelligence Tools

By “Intelligence Tools” we refer mainly to dedicated intelligence software tools that help keep the intelligence process together by serving as a searchable database of structured and relevant information. Also, intelligence tools help to automate routines of processing data into intelligence and regularly delivering the intelligence output to its users. Intelligence tools may also include templates and analysis techniques.

An intelligence portal is one of the most tangible elements of an intelligence program, and as such serves as a natural centrepiece of an MI program, even though people, not the software, are doing most of the value-adding intelligence work. Unlike the intelligence process or culture, or other abstract concepts associated with intelligence activities such as needs analyses and workshops, an intelligence portal has a concrete look and feel, and this makes it a great marketing vehicle for the intelligence deliverables and indeed the entire MI program.

2.3.3.5 Intelligence Organization

“Intelligence Organization” refers to the people and the information resources that combined make the intelligence process happen. Appointing someone as the owner of the corporate intelligence activity typically is the starting point of forming an intelligence organization, but the person needs both internal and external networks to support their work: internal network of intelligence users and contributors from different parts of the organization, as well as an external network of information sources that may include outsourcing partners, databases, industry consultants, research report providers, and so forth.

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70 Hedin, H., Hirvensalo, I., & Vaarnas, M. (2014): Handbook of Market Intelligence, pg. 87
2.3.3.6 Intelligence Culture\textsuperscript{73}

"Intelligence Culture" keeps the entire intelligence program alive, and it obviously cannot be sourced externally. The most important element in building an intelligence culture is senior management’s genuine support of the activity. Other important building blocks are demonstrated benefits of the activity as well as internal training and marketing efforts.

An intelligence culture builds on systematic branding of the intelligence activity that will first raise awareness of the intelligence program, then make the organization accept it as an established approach to handling business information, and finally engage the organization in co-creating the intelligence deliverables.

2.3.4 Maturity stages

There are 5 maturity stages in the road to master the MI program\textsuperscript{74}. They define the experience and the efficiency a company has achieved in its process into becoming a World Class MI company, which are the most benefited of the MI program thanks to its ability to exploit the advantages that it gives. Here are presented the five levels in ascending maturity order:

- **Informal MI “Firefighters”**

  Intelligence activities are mainly conducted on an ad hoc basis with little coordination. Few resources for MI exist, and no scope or process has been defined for MI activities. These companies are almost testers of the effect of the MI program with practically no experience on conducting this kind of business tools.

- **Basic MI “Beginners”**

  “Beginners” are taking the first steps towards a structured intelligence program. Based on an intelligence needs analysis, some fundamental elements of the organization’s business environment are being monitored, still mainly in an ad hoc fashion. These companies start to make a different treatment of the information that is generated during their economic activities and want to get a useful data background from where they can obtain knowledge.

- **Intermediate MI “Coordinators”**

  A structured MI process has been adopted in the organization. There is officially a forward attitude on adapting the company activity to the now approach that the MI program offers. Narrow as its scope may still be, the level of analysis has reached a reasonable level. However, the intelligence program is only loosely integrated to business processes, if at all. A software tool for MI is typically implemented at this stage.

\textsuperscript{73} Hedin, H., Hirvensalo, I., & Vaarnas, M. (2014): Handbook of Market Intelligence, pg. 131-140

\textsuperscript{74} Hedin, H., Hirvensalo, I., & Vaarnas, M. (2014): Handbook of Market Intelligence, pg. 57
- **Advanced MI “Directors”**

The intelligence program is already on a very sophisticated level, and involves an internal organization and connectivity to business processes. There is a significant part of the budget dedicated to MI investment. A solid external network of information sources and vendors has also been established. The deliverables of the MI process match the needs articulated by decision-makers and generate true impact.

- **World Class MI “Futurists”**

MI plays a vital role in both formulating and implementing the company strategy, enhancing the quality of work and future orientation of the entire organization. MI is an integral part of most business processes. These companies are able to innovate in the field of information treatment and their scope is pointing into the future.

### 2.3.5 Impact of MI and Trends

More than anything, MI is a tool for making educated decisions as opposed to merely doing guesswork. Although “decision-making” is a slippery concept and tough to measure accurately, the six Global MI Surveys conducted by GIA between 2005 and 2013 have consistently reported that respondents in companies with systematic MI perceive their decision-making as being more efficient than those in companies without MI. The difference in decision-making efficiency is still more pronounced in companies with world class MI \(^{75}\) (see Figure 12).

![MI and efficiency in decision taking](image)

**Figure 12** MI and efficiency in decision taking \(^{76}\)

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When studying the trends of the MI application, it can be observed that:

- Emerging markets present the biggest opportunities and hence drive the intelligence efforts because they are the ones who would be most benefited from a MI program.
- Social media is also a new trend, being used as a tool of the intelligence process.
- It can be said that there is an increase in the sophistication of intelligence deliverables and in the expertise of the market intelligence team.
- Technological advancements are a constant in the MI process: mobile devices, video webcasts, graphical approaches and dashboards, among others.
3 Structure of the analysis

The analysis conducted in this thesis is based on the study of a group of criteria which contain useful information to define the performance either of the country or the Tooling Industry. The criteria are divided in three categories depending of the object of evaluation: country evaluation criteria, industry evaluation criteria and Market Intelligence evaluation criteria.

The following sections will explain which practical information can be extracted from each criterion and justify its use during this study. An example of how to use this method will be performed in the next chapter on the Spanish market.

3.1 Criteria

This chapter of the thesis pretends to justify the use of the factors chosen to evaluate the Tooling Industry of a country. The information provided from each factor must be significant, reflect trustfully the situation of the market, and be directly related to the study of the Tooling Industry performance and development.

As it has been said, the factors have been divided in three categories: country evaluation, industry evaluation and market intelligence evaluation. On the second category, factors have been divided between globally measured factors and particularly measured factors, depending from their sources, respectively from statistical databases (external studies, official statistical sources, papers…) or from a directly conducted survey.

In this study it is assumed that the object of the evaluation is always the Tooling Industry of a developed country. The optimal case is to conduct this evaluation method on a European country because they are the ones which have more similarities with the Spanish market on terms of finance and trade regulations.

To provide a fast and visual exposition of the results, at the end of each approach, the summary will include a score of each criterion in the form of a Harvey ball. The method followed to punctuate the criteria was choosing a maximum score and a minimum score, (normally the best and the worst punctuation of an advanced country in that field) and divide the range of scores in quintiles, so each quarter of ball belongs to a quintile (see Figure 13):

![Figure 13 Harvey balls score representation](image-url)
3.1.1 Criteria for country evaluation

It must be remembered that the country is the scenario where all activity of the Tooling Industry is performed. The factors of this section will describe the characteristics of the country as a market influenced by economic, political, cultural and technological forces. The criteria are, therefore, classified by the influence force they explain. Complementary to this study, a LoNGPEST is provided with the latest events that has affected the country.

3.1.1.1 Culture and demography criteria

The culture of a country, more than evaluated, can be classified by the behaviour trends of its citizens and the values that the society has adopted throughout history. The GLOBE project culture classification is the adequate criteria to realize this task.

The method follows the concept explained by Geert Hofstede\textsuperscript{77}, who said that the practices and values found in the human culture could be measured in five dimensions of culture (power-distance, collectivism vs. individualism, femininity vs. masculinity, uncertainty avoidance, and long- vs. short-term orientation). The GLOBE project goes a little bit further and explains human culture in 7 dimensions: Power distance, uncertainty avoidance, humane orientation, collectivism institutional, collectivism in-group, assertiveness, gender egalitarianism, and performance orientation.

From another point of view, demography gives us information of the strength of a country on the labour resource. The population of a country, its growth and the percentage of working age population grants us an easy approach of the national taskforce capacity. Unemployment and immigration rates are also studied as its effects on some countries is considerable.

On the other hand, the quality of the labour is directly related to the level of excellence reached on the educational system. The GCI gives an education performance index which can be complemented with the percentage of educational attainment and the average number of years a person spends in the educational system.

At the end of the culture and demography analysis, the labour resource is quantified, its quality measured and its behaviour understood.

3.1.1.2 Economic criteria

The interest of a particular market is based on its size, its wellness and growth, and the opportunities that it offers to its stakeholders. In this case, the size for manufacturing-related business activities is reflected in the size of the industrial sector (as % of the GDP).

\textsuperscript{77} Dimensions of culture (2015): Biography of Geert Hofstede
Structure of the analysis

The wellness and growth of a market is well represented in the figures of the GDP and national debt. Even though, the GDP lacks of some information considered essential, such as the income inequality or the level of inflation suffered by the country. To fill this gap of information, the Gini coefficient and the poverty rate are enough to explain the income distribution, as so are the GDP deflator and the CPI to explain the inflation level.

The advantages a market presents are mainly considered in the index of economic freedom, doing business index and the freedom in the world index. They reflect with which easiness a company can freely develop its economic activity.

The disadvantages of the markets are basically referred as the costs but criminality must be also taken into account. The costs a business must face in this market are evidenced in the labour (average wage), transport (transport infrastructure index) and energy costs. In addition to this information, the real interest rate provided by World Bank shows the costs for financing the activities of the business.

At the end of the economic analysis, the market is defined by its wellness, size and growth, and its attractiveness sketched by the advantages and disadvantages it has.

3.1.1.3 Governance criteria

The market is never a space without regulations where stakeholders create their own equilibrium. Laws and policies change radically the market and shape it in order to satisfy the interests from the country.

Tax revenues indicate the pressure citizens must stand from their own government in order to keep public services and grant the economic wellness of the country. Businesses also see their profits reduced from these taxes, a high total tax rate will discourage companies to develop economic activities in this country.

With the money generated from taxes, the government has the capacity to promote the growth of the country. If this money is spent wisely or not, it will condition in good measure the performance of the country. This government efficiency is reflected in the government spending ratio, budget deficit and debt ratios, and the debt to GNI.

There are other actuations not directly attached to the good management of the country’s finances but, even so, must be considered because determines the trust citizens and external investors have in the country government. The WGI qualifies governments around the entire world and it’s a good measure of the confidence politics of a country deserve.

At the end of the governance analysis, the government pressure on the stakeholders is shown and the efficiency of its policies evidenced. Also it will enable to know how trustful the politics of the country are.
3.1.1.4 International trade criteria

When members of a country start to exchange goods and services with foreign companies, the country may benefit from this interchange because the local market is expanded and demand grows. But also when there is a high dependence from foreign products, it may affect negatively the local economy because each time the foreign country reduces its external offer or raises the price of the products, the importer country has no choice than accept the imposed conditions.

To see how much a country depends on its imports, the balance of trade becomes a great help. When a country imports over its financial possibilities, it must use their reserves or import capital to pay these extra imports. That situation is reflected in the current account ratio. To measure up if the country is creating more capital with its external debt than the cost of this capital, the appropriate indicator will be the debt service ratio.

At the end of the international trade analysis, will be evidenced the country dependencies from the international market and how it is performing generating capital from these transactions.

3.1.1.5 Knowledge and technology criteria

Innovate is almost as important as producing physical goods. Be the first on applying new technologies, not only reduces the country dependency on other more innovative countries, but also means be the first on producing faster, with better quality and less costs.

The % of GDP invested in R+D is a good way to evaluate the level of involvement of a country in innovation. The success in these fields will mean a higher technological readiness and an increase in the number of scientific discoveries, evaluated both in the GCI index.

At the end of the knowledge and technology analysis, it will be possible to discern the concern of the country to produce innovation products and by doing so keeping its technological resources updated.
3.1.2 Criteria for Tooling Industry evaluation

The next step of this evaluation method consists in studying the performance of the Tooling industry as the main actor in this defined scenario, the country market. The criteria have been classified as data-based or survey-based depending of the source used to get the required information. Attached to the annex, the reader can find the questions of the survey and the answers of the respondent companies.

3.1.2.1 Product criteria

These criteria analyse how much the Tooling industry produce in this country and which kind of products. The ISTMA statistical year book provides this information annually with some highlights and comments. Also it permits to the reader study the variations throughout the last 12 years. This information is crucial to determine the growth of the Tooling market and the success of the local toolmakers on maintaining a competitive position.

Following to the production, the international trades will be also examined. To evaluate the globalisation effect on the Tooling industry, a close-up view of the imports/exports of the country on matter of tools, moulds and dies will determine if the toolmakers of the country are able to satisfy the local demand and even to supply other countries.

Not only quantity but also complexity of the product must be considered, it shows the clients increment on exigence and reflects how advanced is the toolmaking industry. This data is not easy to reach but, through a survey, it is possible to know the number of different operations a product suffers during the manufacturing process. The most complex products need a higher number of operations.

The distribution of the product costs also defines its complexity and if it is a capital-intensive product or labour-intensive, indicating the relative weight of each resource on the product. On the survey, the companies have classified them in three categories: labour, materials and energy costs.

3.1.2.2 Industrial environment criteria

The Tooling industry has been facing challenge after challenge since the 2008 crisis that affected the whole world. The arise of the Far East industry and the reduction of the demand have led the toolmakers to exploit new business areas or to sell their products in the international market.

This trends have been checked on the survey dividing them into experience with international transactions and search of new business opportunities such as offering products with more added value, increase the cooperation with suppliers, clients and partners, seek of new processes or improvements, and expansion to other market areas.
For the level of globalisation, it has also been taken into account if the language of the website of the company could be changed, because it is an effective technique to find foreign clients in a passive way, being reachable from the distance.

Other important information to extract from the survey will be the size of the local companies. In order to reach this objective, the companies will be asked about the number of habitual clients they supply and the number of workers that conform the company labour force.

3.1.2.3 Resources criteria

The three pillars which support the Tooling industry are the labour, the financial capacity and the technology. The experienced toolmakers do not rely so much in the number of their taskforce but in their knowledge and preparation. To evaluate this tendency, one part of the survey requests the number of higher-education workers in the taskforce of the company.

For what refers to technology, the survey analyses which of the latest advancements can be found in the country’s companies, MI can be found between them. Also innovation within the company plays a critical role if the company wants to stay on the vanguard of the technique and take competitive advantage to their competitors. A correct manner to see how much a company seeks to be innovative is to check the R+D investment they do per year.

The financial capacity is generated from the reserves of companies, the benefits they get annually and the loans borrowed to banks. The last compound is directly attached to the interest rates and the economic situation of the country; it is studied in the section referred as country analysis. The other points can be only studied having access to the accounts of the companies so they are not included in this methodology.

3.1.2.4 Process criteria

The excellence of company’s processes determines in a great measure the quality of the product and its costs. In the Tooling industry, time is always one of the scarcest resources and each delay has a great impact in the company benefits.

Certificates assure that the process is capable to provide products with a high quality and without important time losses. To reflect the efficiency of the overall sum of processes in the manufacturing chain, the companies surveyed will give the percentage of late deliveries that they do annually, it will show also the level of reliability that someone can expect from the due date these companies agree with their clients.

3.1.2.5 Summary table

All the criteria of this section can be summarized and classified by either if they have been extracted from a statistical database source or from the survey that has been conducted on the local companies (see Figure 14).
3.1.3 Criteria for MI evaluation

Evaluate the effects of MI on a company is an arduous activity because their outputs are often not directly related to the measurable indicators of company's performance or to its economic benefits in the short term.

Even when the outputs of MI are evident and easily measurable by the members of the company, for an external viewer it is compulsory to obtain this information by accessing to the company’s data or interviewing its workers and directives. Any other way of doing such analysis will lack of enough contrasted proof to be considered reliable.

On the way to evaluate the application level of the MI program in a company, it is possible to determine its maturity level through the six key success factors of MI: intelligence scope, process, deliverables, tools, organization and culture. A higher maturity level means that people are more used to this way of working and thinking and they take more profit from this organization tool. The more mature the intelligence program of an organization is, the more time is typically spent on analysis work, which produces reachable and useful information, as opposed to just collecting information and storing it in the company severs, where remains with almost no use.

In the following grid are present for each factor the property that defines each maturity level reached by the company (see Figure 15):

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**Figure 14 Criteria for the Tooling industry evaluation**

<table>
<thead>
<tr>
<th>Data-based criteria</th>
<th>Survey-based criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>production, imports/exports, language of website, certificates</td>
<td>number of operations,</td>
</tr>
<tr>
<td></td>
<td>product costs distribution,</td>
</tr>
<tr>
<td></td>
<td>international transactions,</td>
</tr>
<tr>
<td></td>
<td>new business opportunities,</td>
</tr>
<tr>
<td></td>
<td>number of habitual clients,</td>
</tr>
<tr>
<td></td>
<td>number of workers,</td>
</tr>
<tr>
<td></td>
<td>number of higher-education workers,</td>
</tr>
<tr>
<td></td>
<td>latest technology advancements,</td>
</tr>
<tr>
<td></td>
<td>R+D investment,</td>
</tr>
<tr>
<td></td>
<td>percentage of late deliveries</td>
</tr>
</tbody>
</table>

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**Figure 15 Maturity levels for each factor**
**Figure 15 MI maturity level**

<table>
<thead>
<tr>
<th>Intelligence Scope</th>
<th>Informal MI “Firefighters”</th>
<th>Basic MI “Beginners”</th>
<th>Intermediate MI “Coordinators”</th>
<th>Advanced MI “Directors”</th>
<th>World Class MI “Futurists”</th>
</tr>
</thead>
<tbody>
<tr>
<td>No specific focus</td>
<td>Seek quick wins</td>
<td>Understand the environment</td>
<td>Monitor environment</td>
<td>Covers topics outside the immediate operating environment</td>
<td></td>
</tr>
<tr>
<td>Intelligence Process</td>
<td>Reactive ad hoc</td>
<td>Information collected from external sources</td>
<td>Information collection and analysis of primary sources</td>
<td>Market analysis</td>
<td>Full integration of MI in decisions and processes</td>
</tr>
<tr>
<td>Intelligence Deliverables</td>
<td>Email and shared folders</td>
<td>Intranet with storage</td>
<td>MI portal and email alarms</td>
<td>Multiple access interface to the MI portal</td>
<td>Incorporation of IT tools</td>
</tr>
<tr>
<td>Intelligence Tools</td>
<td>Reactive ad hoc</td>
<td>Regular newsletters</td>
<td>Market reports</td>
<td>High analysis</td>
<td>Innovative methods</td>
</tr>
<tr>
<td>Intelligence Organization</td>
<td>No specific resources</td>
<td>One responsible person</td>
<td>One fully dedicated person</td>
<td>MI team</td>
<td>Powerful MI team and internal collaboration</td>
</tr>
<tr>
<td>Intelligence Culture</td>
<td>No shared knowledge</td>
<td>Neutral towards MI</td>
<td>MI training and marketing</td>
<td>Active participation on MI</td>
<td>Innovative approaches</td>
</tr>
</tbody>
</table>
Of course, even defining the maturity level of companies, to see how they have benefited from the MI program, a survey is compulsory. The results of this survey will give proof of the changes and improvements the companies had experienced through the application of MI.

Usually the **global results** of applying a MI program can be summarized in 4 affirmations: decision making is faster and better, improvement on time and cost savings, workers share information efficiently and the organisation is involved in the program. Asking the companies if these objectives have been met will provide enough information to determine the effectivity of MI.
4 Study of the Spanish market

The study follows the evaluation method described in chapter 3 and it certifies the effectivity and capacity of the proposed methodology. At the end of each section there is a summary sheet are placed the score of each category in the form of Harvey balls.

The sections of this study are defined each one to the perspective it approaches: the country situation, the local Tooling Industry performance and the current state of Market Intelligence through this industry. Each section is, at the same time, divided into the categories that are used to build each perspective.

4.1 Country Evaluation

This perspective has 5 categories that have been evaluated on the Spanish market considering the country as economic environment: Culture and demography, economy, governance, international trade, and knowledge and technology. They are complemented by the conduct of a LoNGPEST analysis.

In the Summary sheet is provided a compilation of the values of the studied factors. Also, in addition to the calculated general score of the country situation, it contains the score of each criterion represented on the form of Harvey balls.

4.1.1 Latest events

Knowing the last events that occur in the market is also part of the market evaluation; these news may have an impact in the large term so it is important to monitor them. This information has been extracted from the main newspapers of Spain and economic journals (see Figure 16).
<table>
<thead>
<tr>
<th></th>
<th>Political</th>
<th>Economic</th>
<th>Sociocultural</th>
<th>Technological</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Local</strong></td>
<td>Elections to the Parliament of Catalonia the 27th of September</td>
<td>Procrastination of local banks has descended</td>
<td>Barcelona and Madrid qualified as the best cities to live in Spain by the group “The Economist”</td>
<td>Drones still do not have proper government regulations in most countries</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The local business turnover has increased</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>National</strong></td>
<td>Public expenditure of 2016 accorded to a maximum of 123 394 million €</td>
<td>Augment of exportations and diminution of the balance of trade’s deficit</td>
<td>The Central Bank of Spain foresees a downfall of the unemployment rate of Spain to 20%</td>
<td>Apps as the new communication method to reach the technology user</td>
</tr>
<tr>
<td></td>
<td>Approval on the Congress to support the rescue of Greece by the UE</td>
<td>Cost of petroleum has felt</td>
<td></td>
<td>3D printers and robots open a new world of opportunities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spanish risk premium in 137 (19th August 2015)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Global</strong></td>
<td>Anticipated elections in Turkey because prime minister was not able to build a government</td>
<td>Surplus on the Current Account Balance of the Eurozone</td>
<td>Number of migrants arriving in EU tripled since last year</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Third rescue of Greece by the UE on discussion</td>
<td>Diminution of the production on the building sector</td>
<td>Ukraine war keeps away a friendly relationship between EU and Russia</td>
<td></td>
</tr>
<tr>
<td></td>
<td>FMI gives a positive valuation of the expecting economy growth of Spain</td>
<td>Devaluation of Yuan</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 16 LoNGPEST conducted on the last events of the Spanish market*
4.1.2 Culture and demography

As it was explained in Chapter 2, a culture can be sketched by its cultural dimensions. In this approach, the analysed cultural dimensions are the ones recommended by the GLOBE research project\textsuperscript{79}. For the Spanish culture, the values obtained in each dimension define its society as: quite collective in group interactions, marginally non-future-oriented, a bit non-gender-egalitarian and with a little non-humane-orientation and a slightly high power distance.

These characteristics present the Spanish as (see Figure 17) people that act lightly more looking to the immediate future than based on planning and long-term objectives. In their organizations or families, individuals slightly tend to express pride, loyalty, and cohesiveness, what is seen as a valuable thing by the society, but not always are rewarded for altruistic or generous actions. Gender inequality is not completely eradicated and power differences between the community members are normally accepted.

On the other hand, the members of this society think they should make more plans aiming on the far-away future and be lightly more formal and conservative when taking decisions which may imply a risk. They believe institutions should be encouraged a bit to be more collaborative. Also, they feel both kind acting and excellent performance should be sufficiently recognized and rewarded. Even experienced, gender inequality is seen as reproachable, slightly, but power differences are considered despicable.

\textsuperscript{79} GLOBE (2015): Characteristics of the study
In the field of **demographical changes**, the last study from the Spanish Statistical Office (Instituto Nacional de Estadística; INE) said that there were 46.512.199 people residing in Spain at the beginning of the year 2014. There was a correct gender distribution, with a 49,2% of men and a 50,8%, women. Legal immigration is accounted to sum up to 4.677.059 people, from which 50,9% are men and 49,1%, women. That means that a 10% of the residents of the country are immigrants.

The population of Spain, altogether, was shifting down the last year 2014 with a -0,46% value, even though the Spanish population, meaning the people with a registered Spanish nationality has been growing the last years (see Figure 18).

---

The number of working age population in Spain met a peak in 2010 but it has been gradually lowering since then. Surprisingly, the percent of people in the working age compared to the total population has dropped from 63.85% to almost 62% (see Figure 19).

This shift is due to the decrease of births and the increase of life expectancy, which implies a major percent of elderly population. As it is shown in figure 18, the percentage of people of

---

81 INE database website (2015): Demography

82 INE database website (2015): Demography
less than 20 years remains constant and the percentages of mature people (between 40 and 64 years) and old population grow fast (see Figure 20).

![Population distribution by group age](image)

**Figure 20 Population distribution by group age**  

Besides, the **unemployment** in Spain has met horrific numbers since the beginning of the global crisis of 2008. From an average total unemployed population of 9% in 2008 to a 26,3% in the last quarter of 2013, these numbers position Spain between the most affected labour markets during the crisis. The effects are still present: social unrest has been gradually increasing and it has become a slowing factor for the country's recovery.

The unemployment raise has not been as homogeneous as it is thought. The rural areas have suffered the hit slightly more than the cities but the greatest difference is settled between the northern and southern regions. In 2012, the North experienced a rise on the number of unemployed from 5,9% to 15,9% while the South jumped from an 11% to 32,8%. In both cases, they havetriplicated their normal rates but of course the situation is worse in areas in the South like Andalucía than in the North: Navarra, Asturias or Basque country, for example (see Figure 21).

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83 INE database website (2015): Demography

84 ILO analysis (2015): Spain unemployment analysis
Nowadays the situation seems to start a recovering trend but the numbers are still far away from the other European countries. The unemployment rates of May 2015 show that still more than a 20% of the active population is unemployed, and between the young populations the rate is almost of the 50%. These conditions have aggravated the migration of young talent to other countries and reduced the size of the labour market on qualified taskforce (see Figure 2).

---


86 INE database website (2015): Unemployment
On the other side, Spain has been suffering illegal immigration from a long time ago. Its effects are purely harmful because it represents a huge amount of bureaucratic work and an important public investment to patrol the frontiers and to repatriate this kind of immigrants. The situation has been improving from 2006 but still the costs of this strict control have an important impact in the public accounts (see Figure 23).

![Number of illegal immigrants](image-url)

**Figure 23 Illegal immigration in Spain**

The GCI index qualifies the higher education and training system of Spain with a 5,2 out of 7, which situates this country the 29th in the education ranking. The OECD average is 5,4, that means the education level of this country is slightly weaker compared to other developed countries (see Figure 24).

On close analysis, it is possible to see that a great percentage of the citizens had and has access to the educational system but it is because of its poor quality and the small extent of the training staff that Spain has not a great recognition in the educational field. A remarkable exception comes when evaluating the management schools, which excel in quality even in the global rankings.

---

The OECD\textsuperscript{88} has calculated a percentage of educational attainment of 55%, which positions Spain between the lowest rates of population with a high-school degree. This low educational index contrasts with the high rate of adults (between the 25 and 64 years old) which hold a university degree, 31% of the total population. It is possible to see a consequence of this high percent of people with university studies on the average of years a Spanish student tends to spend in the educational system: 17.6.

These data positions Spain in the top position between the Southern European countries\textsuperscript{89} and makes proof that, even having a low educational attainment, Spain has a decent production of young talent and therefore qualified taskforce.

\textsuperscript{88} OECD Better life index (2015): Education

\textsuperscript{89} OECD ranking review (2015): Higher education rates
4.1.3 Economy

For the manufacturing economic activities, Spain presents a 23% of its GDP that is based on industrial activities and manufacturing added value; that responds directly from the size of the industrial sector. Almost all the developed countries, except the ones which do not have a large territory, have this level of industrial added value.

On the other hand, the Spanish GDP stands the 12th position in the world ranking, although when calculating the per capita figure, it sinks until the 34th place. That confirms Spain as a high developed country with an amount of goods and services greater than Russia or Mexico, even though not as rich as other European countries with similar development stages.

The effects of the crisis have affected dramatically to the GDP, which has been experiencing annual decrease since 2008 (see Figure 25). A great speculative real-estate market and a high dependence on foreign resources are the main causes of the huge impact on the Spanish economy. The political inefficiency may have help but it is still a matter of discussion if the political system is not correctly organised or the members of the government had a lack of skills to deal with the economic downturn.

<table>
<thead>
<tr>
<th>Date</th>
<th>GDP Mill. €</th>
<th>Annual Change*</th>
<th>GDP Per C.</th>
<th>Annual Change*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>1.058,469 €</td>
<td>1,4%</td>
<td>22.780 €</td>
<td>1,2%</td>
</tr>
<tr>
<td>2013</td>
<td>1.049,181 €</td>
<td>-1,2%</td>
<td>22.528 €</td>
<td>-0,2%</td>
</tr>
<tr>
<td>2012</td>
<td>1.055,158 €</td>
<td>-2,1%</td>
<td>22.562 €</td>
<td>-1,9%</td>
</tr>
<tr>
<td>2011</td>
<td>1.075,147 €</td>
<td>-0,6%</td>
<td>23.015 €</td>
<td>-0,9%</td>
</tr>
<tr>
<td>2010</td>
<td>1.080,913 €</td>
<td>0,2%</td>
<td>23.214 €</td>
<td>-0,2%</td>
</tr>
<tr>
<td>2009</td>
<td>1.079,034 €</td>
<td>-3,6%</td>
<td>23.271 €</td>
<td>-4,1%</td>
</tr>
<tr>
<td>2008</td>
<td>1.116,207 €</td>
<td>1,1%</td>
<td>24.274 €</td>
<td>1,6%</td>
</tr>
</tbody>
</table>

*Calculated from real GDP

Figure 25 Spain GDP

One way or another, the GDP has not grown until 2014 and it recovers slowly. The Spanish economic environment has become though these last years: with banks lending less money and with stricter conditions, the financial difficulties experienced by companies and

90 Global Economy (2015): GDP at constant dollars

91 Global Economy (2015): GDP per capita (PPP)

individuals have increased. Only these last quarters seemed that the economic measures applied to counter the crisis have started to give their fruits.

The public sector has shared the same luck, with cut-outs in almost all their departments and raising the national debt to a maximum of 98% of the GDP. The cipher from the debt has doubled in a period of 8 years (see Figure 26). Other European countries that have reached similar numbers are Greece, Italy, Portugal, Ireland and Belgium.

<table>
<thead>
<tr>
<th>Date</th>
<th>Debt Mill. €</th>
<th>€ Per Capita</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>1,033,857 €</td>
<td>22,256 €</td>
</tr>
<tr>
<td>2013</td>
<td>966,181 €</td>
<td>20,739 €</td>
</tr>
<tr>
<td>2012</td>
<td>890,993 €</td>
<td>19,042 €</td>
</tr>
<tr>
<td>2011</td>
<td>743,531 €</td>
<td>15,919 €</td>
</tr>
<tr>
<td>2010</td>
<td>649,259 €</td>
<td>13,952 €</td>
</tr>
<tr>
<td>2009</td>
<td>568,700 €</td>
<td>12,264 €</td>
</tr>
<tr>
<td>2008</td>
<td>439,771 €</td>
<td>9,564 €</td>
</tr>
</tbody>
</table>

**Figure 26 Spain National Debt**

The public debt have been rising from the year 2007, evidencing the needs of the Spanish market on external financial supports and the failure of the banking system (see Figure 27). The government expenditure has not met the required economic growth needed to reduce the size of the debt into comparison with the GDP.

---

The GDP shows that the overall richness of this country is noticeable, only 4 places under Italy and 6 from UK in the world ranking, but the real situation is not well reflected on this indicator until taking a sight on how this richness is distributed. 29.2% of the Spanish population is at risk of poverty or social exclusion, the low incomes, the high unemployment rate and the lack of financial support for investing in social policies were the principal factors that have leaded to this situation.

The socioeconomic differences have widened, as it is possible to see in the increase of the Gini Index, specially splitting the medium class into the ones who have dealt better with the austerity period and the ones which have reduced greatly its standards of living (see Figure 28).

---

95 Eurostat (2015): Gini Index, and
  Eurostat (2015): Poverty and exclusion rate
The inflation levels reflected on the GDP deflator and the CPI show a considerable reduction in its growth. The CPI growth presents strong variations compared with the GDP deflator but, since the year 2011, it experiences a decreasing trend which seems to aim to incentivise consumption and by so reactivating the economy (see Figure 29). The market seeks to recover clients by lowering prices due to the reduction of the consumers’ purchasing power.

![Inflation figures: CPI and GDP deflator](image)

**Figure 29 Inflation figures: CPI and GDP deflator**

Spain’s economic freedom score is 67.6, making its economy the 49th freest in the 2015 Index. Its score has increased by 0.4 point since last year, reflecting improvements in six of the 10 economic freedoms, driven by investment freedom, monetary freedom, and the management of government spending, that outweigh declines in freedom from corruption and fiscal freedom. Spain is ranked 21st out of 43 countries in the Europe region, and its overall score is above the world average.

Over the past five years, a 2.6-point drop in economic freedom has pushed Spain’s economy into the “moderately free” category. Deteriorations in six of the 10 economic freedoms have been led by declines in the management of government spending and financial freedom. Nevertheless, Spain’s most recent uptick in economic freedom reverses three straight years of declines. The rule of law is respected, and export growth is encouraged by an open trade and investment framework.

---

96 World Bank (2015): CPI  
97 World Bank (2015): GDP deflator  
Even when procedures for establishing a business have been streamlined, and labour market reforms such as reducing licensing requirements have been applied, Spain stands the 33rd place in the global *Ease of doing business* rank, 22nd of the OECD\textsuperscript{99}. There is not a main reason but the overall process factors are responsible of this results.

As almost all Europe, Spain has the first position in the *Freedom in the world index* ranking. Only Macedonia, Ukraine, Moldova, Bosnia and Herzegovina are the European countries with a Partly Free mark. This index results classifies our country as democratic and respectful with their citizens’ rights.

Another point in which Spain presents a positive output is in the security level they have achieved. With a *criminality* rate of 44,8 offenses per 1,000 inhabitants, the decreasing trend of the last years keeps going on. The violent robs with intimidation have been reduced a 17,3%; burglaries fall a 9,6% and violent criminality has decreased a 14,1% in comparison with year 2013.

Even though, the data also shows an uprising in the number of homicides and murders have increased a 6,6% during the 2014. The final balance, though, remains Spain as an international referent in the fight against criminality.\textsuperscript{100}

It is time to analyse the *costs* companies must face when developing their economic activity in Spain. The average wage in Spain the year 2014 has been of 26,162€ annually or, what is the same, 2,180€ /month, supposing 12 pays per year.\textsuperscript{101} As an indicator on the *labour cost*, Spain is just behind Italy but above other similar countries as Greece and Portugal. This cost is high, as in the other countries of Western Europe, and it has been experiencing a growing trend.

Another important cost that defines the geographical distribution of companies is the transport costs. The GCI index positions the Spanish transporting infrastructure in the 6th place of the global ranking, with a final punctuation of 6,1 from 7 (see Figure 30). The average score of the advanced countries reaches only the 5,6. This structure grants an easy movement of products and people around the country and gives more geographical flexibility to companies.

\textsuperscript{99} Doing business (2015): Ranking
\textsuperscript{100} Ministerio de Interior (2015): Criminalidad
\textsuperscript{101} Expansión [CountryEconomy.com] (2015): Average wage
After labour cost, **energy costs** can be considered the second more important expenditures of a company or industry. The energy has become more expensive than what it usually is. Electricity has shown a great increase in its price that has affected most of the PYME’s negatively (see Figure 31). The cost of 1.000 MWh for a normal company has raised from 73.900€ in 2012 to 97.700€ in 2013, the cost has still been real high in 2014: 92.200€.

The financial situation in Spain has not seen a real recovery yet. The **interest rate** of the BCE to the banks of all the countries belonging to the UE showed a downfall from 3.81% to

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102 Eurostat (2015): Electricity cost
0,71% in the 2009 and from that moment it has keep falling down until reaching a minimal value of 0,09 on the year 2013. Only in 2011 experienced a little arise to 0,87. This measure has got a delayed effect because first banks must lend money to the entrepreneurs and before that entrepreneurs must find opportunities in a hostile economic environment worsened by the last crisis and with little or inexistent owned capital to support their proposals and acquire the lending requirements the bank demands.

It must be remembered than even having the BCE reduced its interest rate to banks, the Spanish legality allows banks to apply a maximum interest rate of 4%, meaning that, even when banks can borrow from BCE for only a little cost, the local banks’ borrowers may have access to this money with a higher financial cost.

In conclusion the economic performance of Spain has not been really admirable from the year 2008 until 2014 but, on the other hand, this market is showing clear signals of recovery and renovation. The most worrying points rely on the lack of financial self-sufficiency and the high unemployment rates. Good local and international policies should be enough to impulse the Spanish economy, as long as the global situation keeps improving.

4.1.4 Governance performance

Spain’s top individual income tax rate is 52 percent, and its top corporate tax rate is 30 percent. Other taxes include a value-added tax and a capital gains tax. The overall tax burden equals 32.9 percent of gross domestic product, which is one of lowest tax revenues of the European countries.

After observing the low tax burden, it appears evident that the government expenditure has become unsustainable. Valuated as a 43,60% of the country GDP, it overcomes greatly the income generated by the taxes. This effect is reflected on the budget deficit for the year 2014: -5,8% of the GDP. The trend of running into budget deficit the last years has risen the Spanish debt to 97.70% of the GDP and in this moment the debt represents a 74,3% of the generation capacity of the country (debt to GNI ratio).

These numbers are already enough to make a tough critic of the governance system of Spain and its method but also the WGI defines the political situation of Spain as really unstable and with a decreasing trend in 4 of the 6 factors (see Figure 32): Control of Corruption, Rule of Law, Voice and Accountability, and Regulatory Quality.

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103 Eurostat (2015): Interest rate
105 OECD statistics (2015): Tax revenues
106 Expansión [CountryEconomy.com] (2015): Spain, and
   World Bank (2015): GNI
107 World Bank (2015): WGI report: Spain
A possible misleading conclusion that the reader can extract from these data is that the government is the one to blame for not smoothing enough the economic downturn but as it can be observed in the WGI graphic, Spain has improved its Government Efficiency from 79.1 to 82.8. Even when is possible to affirm that some members of the government are involved in corruption affairs and its effectiveness on applying new policies is no so reliable as it was before the crisis, seems that the government has reacted with the right strategies to the market failure.

![Figure 32 WGI comparison](image)

**Figure 32 WGI comparison**

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108 World Bank (2015): WGI
4.1.5 International trade

Spain has a privileged position as member of the EU to sell its products without restrictions through most of the European continent. A consequence of this free trading market is that more than 50% of Spanish exports are done to members of the EU and a similar figure comes when talking about its imports. Imports from China are also really important, almost a 7% of the total.

![Figure 33 Imports and Exports of Spain](image)

The overall performance of Spain in the international market is not positive, its balance of trade was negative the last 8 years and the dependence of the country on foreign products is high (see Figure 34). Even during the economic downturn Spain was not able to reduce their imports; instead the export rate augmented seeking to overcome the number of imports.

![Figure 34 Balance of trade of Spain](image)

---

109 Expansión [CountryEconomy.com] (2015): Exports, and

As it can be seen in the graphic, the **Current Account ratio** of Spain has been showing negative outcomes from more than ten years and with a decreasing trend ended in 2008. This behaviour evidences the financial difficulties Spain had to face during the crisis but as the recovery become nearer the Current Account ratio started an increasing trend until giving positive results in 2013 and 2014 (see Figure 35). The consequences of the continued negative output can be observed in the increment of the Spanish debt.

![Figure 35 Spanish Current Account ratio](image)

**Figure 35 Spanish Current Account ratio**

The Spanish debt has a value of 97,70% of the country GDP, compared with its exports rate, 23,07%, the **debt service ratio** results in 423,5%. Spain has not got a great exporting rate, even though, it has been growing fast during the crisis but not enough to face the quick increment of the debt (see Figure 36). The benefits of the Spanish international transactions are not so strong to provide a financing source that supports the national economy.

![Figure 36 Debt service ratio of Spain](image)

**Figure 36 Debt service ratio of Spain**

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On comparison with other countries, it is still more evident the financial difficulties experienced by Spain and its lack of positive income from its international transactions. The only European country that overcomes the Spanish debt ratio is Greece with a value of almost a 1.500% (see Figure 37).

<table>
<thead>
<tr>
<th>Spain</th>
<th>Italy</th>
<th>Portugal</th>
<th>Germany</th>
<th>France</th>
</tr>
</thead>
<tbody>
<tr>
<td>423,5%</td>
<td>396,6%</td>
<td>334,8%</td>
<td>151,2%</td>
<td>342,6%</td>
</tr>
</tbody>
</table>

Figure 37 Comparison of debt service ratios on 2014

4.1.6 **Innovation and technological resources**

Spain has never invested a high percent of its GDP in R&D, the last years the numbers were between 1 and 1,5%. The increasing trend to invest in innovation followed from the year 2005 to the 2008 seems to have been stopped by the economic downturn. This country has not shown the expected inclination of the other industrially advanced countries to rely on its technological advancements to face the arise of the Newly Industrialized countries.

Figure 38 GDP spent in R&D

The GCI index positions the Spanish Innovation in the 37th place with a punctuation of 3,7. The average score of the advanced countries rounds the 5,4, which is substantially superior to the Spanish average. This result could be expected by the examination of the R&D investment.

The mark of Spain on Technological Readiness is only slightly lower than the advanced countries’, 5,4 and 5,8 respectively. This score entitles Spain with the 27th position in the

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112 World Bank (2015): %GDP in R&D
Technological Readiness rank. This punctuation means that even when Spain is not a producer of scientific or technological advancements, its population and companies access quick to these developments and integrate them in their day-by-day processes (see Figure 39).

![Figure 39 GCI index: Technological readiness and Innovation](image-url)
4.1.7 Summary sheet

Country: SPAIN  
Currency: € *(All data referred to year 2014)

CULTURE AND DEMOGRAPHY:

GLOBE dimensions highlights (2010):

Slightly collective in group interactions, non-future orientated, non-gender egalitarian, non-humane orientated, power distant. It is well perceived to be slightly institutionally collective, gender egalitarian and uncertainty avoidant, and somewhat collective in group interactions, future orientated, humane orientated, performance orientated and not power distant.

Population: 46 512 199 people  
Illegal immigration: 4552 cases  
growth -0,46%  
on working age 62%  
GCI Education: 5.2 (29th)  
unemployed 23%  
Educational attainment: 55%  
young 50%  
Average years spent on studies: 17,6

Immigration: 4 677 059 people  
University degree holders: 31%

\[
\text{Score} = \frac{1}{6} \text{Population segm.} + \frac{1}{3} \text{Unemployment} + \frac{1}{6} \text{Immigration probl.} + \frac{1}{3} \text{Education}^{(1)}
\]

\(^{(1)}\) The Education score is obtained from the average of the scores of its components

Figure 40 Culture and demography Harvey balls score
ECONOMY

Industrial sector share: 23% GDP
GDP: 1058469 Mill. €
    growth: +1.4%
    per capita: 22 780 €
    growth: +1.2%
Debt: 1033857 Mill. € (97.7% GDP)
    per capita: 22 256 €
Poverty or exclusion risk: 29.2%
Gini index: 34.7%
CPI growth: -0.1%
GDP deflator: -0.5%
Economic freedom index: 67.6 (49th)
Ease of doing business: 33th
Freedom in the world: 1st
Criminality rate: 44.8‰
Costs:
(L) Average wage: 2 180€/month
(T) GCI Infrastructure: 5.6 (9th)
(E) Electricity cost (1 000 MWh): 92 200 €
Interest rates:
BCE: 0.09%
National legal max interest: 4%

Score = \( \frac{2}{11} \) Share of industrial sector + \( \frac{2}{11} \) Wellness\(^{(1)} \) + \( \frac{1}{11} \) Sense of safety\(^{(2)} \)
      + \( \frac{2}{11} \) Business easiness\(^{(3)} \) + \( \frac{4}{11} \) Cost analysis\(^{(4)} \)

\(^{(1)}\) The Wellness score is obtained from the next equation:

\[
\text{Wellness} = \frac{4}{14} \text{GDP} + \frac{4}{14} \text{National debt} + \frac{2}{14} \text{CPI} + \frac{2}{14} \text{GDP defl} + \frac{1}{14} \text{GINI index} + \frac{1}{14} \text{Poverty rate}
\]

\(^{(2)}\) The Sense of safety score is obtained from the average of the scores of its components

\(^{(3)}\) The Business easiness score is obtained from the average of the scores of its components

\(^{(4)}\) The Cost analysis score is obtained from the average of the scores of its components
Figure 41 Economy Harvey balls score
GOVERNANCE

WGI (2013):
- Control of Corruption: 75.1
- Rule of Law: 81
- Regulatory Quality: 78.9
- Government Efficiency: 82.8
- Political Stability and Absence of Violence: 46.9
- Voice and Accountability: 77.3

\[
Score = \frac{4}{10} WGI + \frac{2}{10} \text{Tax burden} + \frac{1}{10} \text{Government expend.} + \frac{1}{10} \text{Budget def.} + \frac{2}{10} \text{Debt to GNI ratio}
\]

![Governance Harvey balls score](image1)

INTERNATIONAL TRADE

Exports: 244216 Mill. €
Imports: 269713 Mill. €
Balance of trade: -2.41% GDP

\[
Score = \frac{1}{7} \text{Exports} + \frac{2}{7} \text{Imports & Ba. of Tr.} + \frac{2}{7} \text{Current Account ratio} + \frac{2}{7} \text{Debt service ratio}
\]

![International trade Harvey balls score](image2)
INNOVATION & TECHNOLOGICAL RESOURCES

Investment in R&D: 1.3% GDP

GCI Innovation: 3.7 (37th)

\[
Score = \frac{1}{5} \text{Investment in R&D} + \frac{2}{5} GCI \text{ Innovation} + \frac{2}{5} GCI \text{ Technological Readiness}
\]

Figure 44 Knowledge and technology Harvey balls score

COUNTRY GENERAL SCORE

The general score of the country is calculated by doing the average of the 5 previous calculated scores, one for each category that belongs to the country analysis. As it can observed this country stands a general score of half Harvey ball which means a medium performance as environment of the Tooling Industry.

Figure 45 Country Harvey balls score
4.2 Tooling Industry Analysis

This perspective has 4 categories that have been evaluated on the Spanish Tooling Industry as the main actor of the industrial environment: Product, industrial environment, resources and products.

In the Summary sheet, there is a representation on Harvey balls of the score of each criterion; in addition, a representation of the general score of the Tooling Industry is also provided.

4.2.1 Product evaluation

The products of the Tooling sector can be classified in numerous ways, for example: by weight and cost, by dimensions or by the material they are formed. In this case, the classification has been done by the material the tool must transform and function of the tool:

- Tools for pressing, stamping, punching and forming
- Injection and compression moulds for plastics
- Mould tools for metals and metal carbides excluding injection
- Mould tools for metals and metal carbides

When observing the production of the tools for pressing, stamping, punching and forming, is surprising to see that the years 2011 and 2012 have had more exports than production. The only reasonable explanation is that part of this external demand is met by the imports of Spain, because the production has grown just a little but exports and imports have increased their numbers more radically (see Figure 46).

![Chart showing tools for pressing, stamping, punching and forming](image)

**Figure 46 Tools for pressing, stamping, punching and forming**

---

Spain consumes a long way more injection and compression moulds for plastics than they produce. The trend seems to be an augment of the local production to reach the external demand more than the local but still in the year 2012 it is possible to observe an increment on the number of imports, evidencing the need the Spanish market has of these products (see Figure 47).

![Injection and compression moulds for plastics](image)

**Figure 47 Injection and compression moulds for plastic**

Excluding injection, the Spanish Tooling sector of mould tools for metal or metal carbides has experienced a remarkable change. In 2010 it seem perfectly capable to reach both local and international demand but it seems the industry has focused in satisfy their exports and the local clients had to rely on foreign traders as it is possible to observe in the increase of imports (see Figure 48).

---

On the same field of mould tools for metal or metal carbides but for injection, the production has meet a maximum in 2011 and in 2012 went down again, just as the imports what leads to think that this sector has experienced a downfall on its local demand. On the other side, the exports have grown. It is interesting to see that this kind of moulds have a really high production compared to the exports and imports, meaning that most of the clients of this market are local manufacturers (see Figure 49).

![Mould tools for metal or metal carbides excluding injection](image)

**Figure 48 Mould tools for metal or metal carbides excluding injection**

![Mould tools for metal or metal carbides](image)

**Figure 49 Production, exports and imports Mould tools for metal or metal carbides**

---


The apparent consumption, known as the sum of production and imports minus the exports, has risen in 2 of the 4 product sections of the Spanish Tooling Industry. Spain presents an important production and consumption of injection and compression moulds for plastics, even though it is far away from the numbers it presented before the crisis, between 2 and 2.5 times the current production.\footnote{Ferro Camacho, J. (2014): ISTMA Statistical Yearbook - Edition 2014, pg. 268, 269}

The mould tools for metal or metal carbides (injection), by depending greatly on the local demand, has shown a negative growth on year 2012 and the change of focus from the local to the foreign demand in the market of mould tools for metal or metal carbides excluding injection is reflected on the year 2011 but it has returned to the expected increasing tendency in 2012 (see Figure 50).

\textbf{Figure 50 Apparent Consumption in thousands of euros}\footnote{Ferro Camacho, J. (2014): ISTMA Statistical Yearbook - Edition 2014, pg. 267}

For all 4 sections, imports have increased their numbers considerably and seem to keep this trend because of the prices are lower in the international market because of the exports of the Far East Tooling Industry into Europe and the remaining effects of the economic crisis.

All sectors seem to start a slight recover from the demand fall from the last years, the recuperation seems to have grown faster in the market of mould tools for metal or metal carbides excluding injection thanks to its strategy change. Even with the economic downturn, the exports of the Spanish Tooling Industry have presented some resilience and now they are growing even faster than the production of some sections.

Half of the Spanish surveyed companies explained that their main product needed to get through between 4 or 6 different operations in the manufacturing chain. A little more than a third of the companies answered that they needed between 8 and 10. In can be deduced that the Spanish toolmakers slightly produce more low complexity tools than really complicated
moulds and dies, but it must be remarked that these complex products reach a 42% of the total. This high proportion of intricate tools reminds the reader that the evaluated industry is based on a sophisticated demand, typical on the Tooling Industry market (see Figure 51).

![Figure 51 Number of operations on the main product](image1)

The costs of the main product have been distributed in three categories: labour, materials and energy. A 75% have assigned more than a half of the cost of the product to labour costs, evidencing it as their main cost but also as their more valuable resource. In contrast, only 33% have answered that they spend more than a 30% of the product value on materials. The results also show that even being the lowest average cost, a 42% of the companies have given a 20% of the product cost to energy spending, this value is the maximum of the energy cost range (see Figure 52). As it was expected, the Spanish Tooling Industry presents a labour-intensive structure.

![Figure 52 Average labour, materials and energy costs](image2)
4.2.2 Industrial environment evaluation

Most of the surveyed companies have entered the international market, but merely a few are really immersed in the globalisation trend. A 33% of these companies maintain an active exporting attitude with monthly deliveries into foreign countries. 75% of them (1 out of 4 on the total count) have partners in the importing countries to help them with the commercialisation and distribution of the product but only a 50% have got facilities on other countries, normally in the American continent because of the great distance and schedule differences (see Figure 53).

![Figure 53 Frequency of international transactions](image)

During the survey, companies were asked which of the following new business opportunities were following or were planning to follow in the immediate future. The results are presented in a matrix strategies-companies answer (see Figure 54) to show the possible relations when companies follow more than one strategy:

A. Offering products with more added value,
B. Increase the cooperation with suppliers, clients and partners,
C. Seek of new processes or improvements,
D. Expansion to other market areas.
As it can be observed, cooperation with other actors of the market is the first strategy that companies follow, ahead of developing their processes or products. Another conclusion to extract from these answers is that it is preferred to expand the business to new areas before offering more added value in the product.

It is not habitual to see large companies in the toolmaking sector, nevertheless, most of the Spanish companies are composed by more than 10 people and half of the surveyed firms present even more than 20 members. Two thirds of the companies cover each one the demand of more than 10 habitual clients (see Figure 55).
Another remarkable point is that the number of clients is not directly correlated with the number of clients. No differentiation has been done between international and local clients, so here is present the global demand not only the one originated by the Spanish market (see Figure 56).

For the level of globalisation, it has also been taken into account if the language of the website of the company could be changed, because it is an effective technique to find foreign clients in a passive way. The company stays reachable even when its clients do not reside in the same country (see Figure 57).

Figure 56 Number of clients

Figure 57 Number of languages on the website
4.2.3 Resources evaluation

As it was said before, the most important resource of the Tooling Industry is their labour force. The Spanish toolmakers have been for a long time exploiting this market and have achieved a deep knowledge in their field. They give a high recognition to work experience and managerial skills, and search involvement in the new recruits. Almost a 60% of the surveyed companies recognize that more than a 10% of their taskforce own a university degree equivalent to an Engineer’s Degree or a Master. In some cases between a 30% and a 50% of the total labour own this kind of certificates (see Figure 58).

![Figure 58: Higher education graduated workers](image)

The other resource that gives an important competitive advantage to the Tooling companies is the technology vanguard they use to present. In the survey, it was asked which of these 6 technological advancements they apply regularly in their production chain:

- A. Automatisation of processes
- B. CNC
- C. Modelling, simulation and forecasting software
- D. Advanced manufacturing processes
- E. Advanced materials in manufacturing systems
- F. Market Intelligence program

All the companies have invested in CNC, which marked an after and before in the concept of understanding the Tooling Industry production. Almost every company use frequently a designing model as CAD or plant simulation software, the ones which do not follow this trend is because they work with external engineering consultancy firm. A 75% have applied automatisation to their processes in order to accelerate the production and reduce time losses between operations.

Only a few firms work with advanced processes of machining or complex methods of tool manufacturing, they offer these means to their clients more as a complement than a main
service and when demand is extremely sophisticated. No company has invested in working on special or just-discovered materials and neither has applied a MI program during the business lifetime (see Figure 59).

<table>
<thead>
<tr>
<th>Technologies applied by company</th>
</tr>
</thead>
<tbody>
<tr>
<td>A √ √ √ √ √ √ √ √ X X X 75%</td>
</tr>
<tr>
<td>B √ √ √ √ √ √ √ √ √ √ √ 100%</td>
</tr>
<tr>
<td>C √ √ √ √ √ √ √ √ √ √ √ X X 83%</td>
</tr>
<tr>
<td>D √ √ X X X X X X X X X 17%</td>
</tr>
<tr>
<td>E X X X X X X X X X X X X 0%</td>
</tr>
<tr>
<td>F X X X X X X X X X X X X 0%</td>
</tr>
</tbody>
</table>

Figure 59 Technologies applied by companies’ matrix

It is quite impressive to see that most Tooling firms invest no money or almost no percentage of their benefits in innovate. The economic downturn has not left any margin to these companies to research on new methods or to try with other business structures. The companies with the higher percent of invest in R&D are the bigger ones, with also the higher percent of high graduated workers and actives in the international market.

Figure 60 Benefits invested in R&D, year 2014
4.2.4 Process evaluation

The Tooling Industry is really exigent with the delivering dates and any delay can be fatal to both the toolmaker and the client. For the majority of the Spanish Tooling Industry these are the conditions they must face day after day, most of them have not presented any delay in any of their deliveries of the last year 2014 (a 25%) or only one late service (a 33%). It must be mentioned that these delays are normally less than a day, possibly only hours, and all of them do not overpass a workweek. The clients of these companies are extremely susceptible to delays because their efficiency and competitiveness rely on a lean manufacturing method with almost no extra stock stored.

But there is also a part of the toolmakers that accept the delays, probably because their relationship with the client permits them to postpone one order to be able to satisfy another more urgent delivery. In these cases the orders tend to be regular and the client has a considerable stock whenever he plans to receive the order so it is far away from the concept of lean manufacturing that should be expected in this industry.

![Pie chart showing delivery delays](image)

**Figure 61 Deliveries which arrive late**

Certificates assure that the process is capable to provide products with a high quality and without important time losses. The habitual certification of the companies of this sector should be an ISO9000 but there is still a considerable amount of Spanish toolmakers which do not own any certificate.
Figure 62 Certificates owned by companies
4.2.5 **Summary sheet**

**PRODUCT**

Figure 63 Product Harvey balls score
INDUSTRIAL ENVIRONMENT

Figure 64 Industrial environment Harvey balls score

RESOURCES

Figure 65 Resources Harvey balls score

PROCESS

Figure 66 Process Harvey balls score
LOCAL TOOLING INDUSTRY GENERAL SCORE

Figure 67 Local Tooling Industry Harvey balls score
4.3 MI evaluation

During the survey, the companies' representatives were provided with a short definition of Market Intelligence as a program and some examples were given in order to make clear they understood the concept referred in the questionnaire without misconceptions. Then they were asked if they have ever had contact with this kind of tools.

All answers were negative, they had never heard about this type of information tools and, as it would be expected, it was not applied in the firm. Making an evaluation of the MI effects has become impossible due to the lack of Spanish companies with a formal MI program. The companies presented some reasons to justify their attitude:

- The small size and low complexity of most of the companies was the strongest motive for not investing in this kind of tools. Information flows easily between the members of the company and the knowledge is preserved by the individuals rather than in accessible data.
- The initial investment is seen as high and the benefits are too focused on the long term for these companies that need results now. They would rather invest in new machinery or in improvements for the manufacturing process; information appears to be in a secondary place.
- The market is not so much perceived as complex rather than tough: solutions are there but they are financially unreachable.
- The mentality of the Spanish toolmakers could be summarized as: “It is not a good moment for innovations (MI application, for example) because the economic downturn has devastated the sector. Now the priority stays in keep giving more quality to the product in order to prevent the loss of clients in front of the lower prices of the Chinese industry."

The crisis has been a determining factor that has lowered all kind of investments in innovation and hidden completely the information tools like MI. The economic recovery and an approach of the MI initiative to the Spanish Tooling Industry, providing the Spanish companies of information and practical examples of MI, will be the first steps in order to spread the application of MI between the most toolmaking firms.
5 Summary and conclusions

This Master thesis concludes with a brief summing of the method with a visual presentation of the results of the evaluation on the Spanish market, a self-evaluation of the work carried out, and some comments and recommendations for further approaches based on this methodology.

The analysis’ motivation is to provide of a tool to evaluate the Tooling Industry performance in a country as its economic environment. The method, product of a research process, does its examination by a three perspective approach: the country, as environment; the Tooling Industry, as the main actor, and the Market Intelligence level reached by the industry.

Each perspective has its own categories; the country approach also shows a LoNGPEST analysis as a way to provide the reader from the last up-to-date data:

- Country: Culture and demography, economy, governance, international trade, and knowledge and technology.
- Tooling Industry: Product, industrial environment, resources and process.
- Market Intelligence: Maturity and impact.

The Harvey balls punctuation grants a quick way to compare the results of various countries by only realising a visual examination. The criteria had different weights depending of their importance and interaction with other factors. The global score of the country has been calculated doing the average of the 10 categories present on the analysis: 5 categories of the country perspective, 4 categories of the Tooling Industry approach, and 1 from considering the general score of Market Intelligence as the tenth category.

The sources used through this thesis are statistical databases and a survey conducted on the most referent toolmaking companies of the country. The whole thesis becomes by the treatment of the information of these sources a valuable product of Market Intelligence, which provides to the reader of a useful and practical knowledge of the Tooling Spanish market.

The next figure is a resume of the results achieved:
Summary and conclusions

For further approaches, the effectivity of the methodology could be improved by complementing and contrasting the information of the criteria with an in-situ evaluation. Accessing to the data stored by companies of their production would be a great upgrade for the Tooling Industry evaluation perspective. Also, visiting the facilities of the most referent companies will permit the person who conducts the analysis the possibility of interviewing the companies’ members and examine the processes in detail.
6 Annex

6.1 Survey to Spanish Tooling companies

The survey was conducted the days 7th and 8th of July by telephone. All the surveyed companies form part of FEAMM (Federación Española de Asociaciones Empresariales de Moldistas y Matriceros). The telephone numbers had been extracted from the website of FEAMM and links.
6.1.1 **Questions in the survey**

The questions were briefly discussed with the interviewed company members, solving any doubt they had *in situ*. Questions were asked in Spanish, here you find the translation to English:

- How many different operations are needed to manufacture the company's main product?
- If we divided the manufacturing costs of the product in three categories: labour, materials and energy. Which percentage will take each one?
- Which range of prices do you have for this kind of products?
- How many international transactions your company does monthly?
- In how many countries is your company present?
- How many international partners your company has?
- Which ones of these business strategies does your company follow?
  - A Products with more added value
  - B Search of new processes or improvements
  - C Expand to new market areas
  - D Promote a higher cooperation with clients, suppliers and partners
- How many clients your company has currently?
- How many workers compose the company?
- How many workers hold a higher education degree?
- Which percentage of deliveries arrive with delay?
- How many weeks late arrive, these delayed deliveries? (average delay)
- Do you use this technology?
  - A Automatisation
  - B CNC
  - C Modelling, simulation and forecasting software
  - D Advanced manufacturing processes
  - E Advanced materials in manufacturing systems
- Which percentage of benefits do you invest in R+D?
- Market Intelligence, understood as a program or an organized method, examines the market and its players in order to obtain useful information for the decision making and facilitating the share of information through the company. Does your company work with this program or any similar?
- If yes, how would you rate your experience with the MI program? Choose from 1 to 5, meaning 5 completely agree and completely disagree.
  - A Decision making is better and faster
  - B It has got a real effect on time and costs savings
  - C Workers share information easily
  - D The company is really involved in the program
- Which is the budget of the MI initiative?
6.1.2 **Results for each company**

6.1.2.1 MOLDPLAST S.L.

Founded in 1994, MOLDPLAST S.L. offers a complete mould manufacturing and maintenance service. Company associated to ASAMM, it is located in Zaragoza. Webpage in Spanish, English, German and French. No certification is shown in the webpage site.

[http://www.moldplast.es/ing/index.html](http://www.moldplast.es/ing/index.html)

<table>
<thead>
<tr>
<th><strong>Answers to the survey:</strong></th>
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<tbody>
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<td>Number of operations:</td>
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<tr>
<td>Costs percentages (Labour/Materials/Energy):</td>
<td>55 / 40 / 5</td>
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<td>Final price (thousand €):</td>
<td>[4 - 80]</td>
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<td>International transactions:</td>
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</tr>
<tr>
<td>Number of international partners:</td>
<td>0</td>
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<tr>
<td>Business strategies followed:</td>
<td>B, C, D</td>
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<tr>
<td>Number of workers:</td>
<td>9</td>
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<td>Number of higher-education-workers:</td>
<td>2</td>
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<tr>
<td>Percent of late deliveries:</td>
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<tr>
<td>Average delay (weeks):</td>
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<tr>
<td>Technologies:</td>
<td>B, C</td>
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<tr>
<td>Investment on R+D:</td>
<td>0</td>
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<tr>
<td>Formal MI program:</td>
<td>N</td>
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<tr>
<td>MI evaluation:</td>
<td>A-0, B-0, C-0, D-0</td>
</tr>
<tr>
<td>MI budget (Mill. €):</td>
<td>0</td>
</tr>
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</table>

Other observations: they indirectly export 30% of their products.
6.1.2.2 MATRICAN S.A.

Constituted in 1978, MATRICAN S.A. provides of high technical and technological level solutions in traditional and highly specialised sectors. It is located in Cantabria. Webpage in Spanish, English, German and French. Their processes’ quality is granted by a certification ISO9001.

[http://www.matrican.es](http://www.matrican.es)

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<td>Number of international partners:</td>
<td>0</td>
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<tr>
<td>Business strategies followed:</td>
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<tr>
<td>MI budget (Mill. €):</td>
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</tbody>
</table>
6.1.2.3 TROQUELES DIE S.L.U.

With 25 years of experience, TROQUELES DIE S.L.U. is dedicated to the manufacturing and maintenance of dies for the stamping of metals. Company associated to ASAMM, it is located in Zaragoza. Webpage in Spanish and partially in French. No certification is shown in the webpage site.

http://www.troquelesdies.com/index.html

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<td>Business strategies followed:</td>
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<tr>
<td>Formal MI program:</td>
<td>N</td>
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<td>MI evaluation:</td>
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<tr>
<td>MI budget (Mill. €):</td>
<td>0</td>
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</tbody>
</table>
6.1.2.4 INDUSTRIAS OCHOA S.L.

Founded in 1970, INDUSTRIAS OCHOA S.L. is dedicated to the design and build of moulds, tools and special machines for the fabrication of products in which the principal material component is metal. Company associated to ACOVEMM, it is located in Valencia. Webpage in Spanish. Their processes' quality is granted by a certification ISO9002 and industrial prizes.

http://www.ind-ochoa.es/index.html

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<tr>
<td>MI evaluation:</td>
</tr>
<tr>
<td>MI budget (Mill. €):</td>
</tr>
</tbody>
</table>

* Without counting temporal workers and 300 people that work for Industrias Ochoa due to an agreement they have with the penitentiary sector so they provide of manual work to prisoners.
6.1.2.5 MATRICERIA CASPE SL

Founded in 1972, MATRICERIA CASPE SL is focused on the design and manufacture of precision moulds for thermoplastic injection and non-ferrous metals, providing technical and human resources in the development and implementation of new technologies. Company associated to ACOVEMM, it is located in Valencia. Webpage in Spanish and English. Their processes’ quality is granted by a certification ISO9001.


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<td>60 / 20 / 20</td>
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<td>Final price (thousand €):</td>
<td>[3 - 70]</td>
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<tr>
<td>International transactions:</td>
<td>4 per month</td>
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<td>Technologies:</td>
<td>A, B, C, D</td>
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<td>MI evaluation:</td>
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<td>MI budget (Mill. €):</td>
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6.1.2.6 MUNDIMOLD S.A.

With 50 years of experience, MUNDIMOLD S.A. is a company specializing in the manufacturing and management of high innovation injection mold projects. Company associated to ACOVEMM, it is located in Valencia. Webpage in Spanish, English, German and French. Their processes' quality is granted by a certification ISO9001 and ISO 14001. They also hold some industrial prizes.

http://www.mundimold.com

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6.1.2.7 MEPRONOR S.L.U.

Restructured as S.L.U in 2011, MEPRONOR S.L.U. provides of technical support as maintenance and reconstruction of moulds but also is able to design and manufacture dies and moulds. Company associated to AGMMA, it is located in Pontevedra. Webpage in Spanish. No certification is shown in the webpage site.

http://mepronor.com/index.php

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<td>Number of international partners:</td>
<td>0</td>
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<td>Number of workers:</td>
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<td>Technologies:</td>
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<td>Formal MI program:</td>
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<td>MI evaluation:</td>
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<tr>
<td>MI budget (Mill. €):</td>
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6.1.2.8 MOLDES PLECAM S.L.L.

Founded in 2003, MOLDES PLECAM S.L.L. focuses on the manufacture of injection moulds for the plastic industry. Company associated to ASCAMM, it is located in Barcelona. Webpage in Spanish. No certification is shown in the webpage site.

http://www.moldesplecam.com

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<td>Business strategies followed:</td>
<td>A, B, C, D</td>
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6.1.2.9 MATRINOX S.L.

Founded in 1980, MATRINOX S.L. is dedicated to the manufacture of moulds, prototypes and tools. Company associated to ASCAMM, it is located in Barcelona. Webpage in Spanish and Catalan. Their processes' quality is granted by a certification ISO9001.

http://www.matrinox.com/index.html

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<td>MI budget (Mill. €):</td>
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6.1.2.10 MATREYCO S.L.

Founded in 1999, MATREYCO S.L. is dedicated to the manufacturing, reparation, maintenance and machining of moulds of medium and high weight for the automobile sector. Company associated to ASCAMM, it is located in Barcelona. Webpage in Spanish. Their processes’ quality is granted by a certification ISO9001.

http://www.matreyco.com/index.htm

**Answers to the survey:**

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<td>MI budget (Mill. €):</td>
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6.1.2.11 MOLTEGI S.A.

Founded in 1996, MOLTEGI S.A. is dedicated to the Development, Design and Manufacture of molds for aluminium die casting, specializing in complex parts with high dimensional and functional requirements of the automotive industry. Company associated to ASVAMM, it is located in Vitoria - Gasteiz. Webpage in Spanish and English. Their processes’ quality is granted by a certification ISO9001.


<table>
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6.1.2.12  INDUSTRIAS ORMOLA S.A.L.

With an experience of 40 years, INDUSTRIAS ORMOLA S.A.L. is specialist in moulds for injection. Company associated to ASVAMM, it is located in Gipuzcoa. Webpage in Spanish and English. Their processes’ quality is granted by a certification ISO9001.

http://www.ormola.com/inicio.html

<table>
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<tr>
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<tr>
<td>MI budget (Mill. €):</td>
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</table>
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http://www.interior.gob.es/documents/10180/3066430/Balance+2014+de+lucha+contra+l+inmigraci%C3%B3n+irregular.pdf/4a33ce71-3834-44fc-9fbf-7983ace6cec4


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Declaration

RWTH AACHEN UNIVERSITY

Faculty of Mechanical Engineering

Master Thesis on Mechanical Engineering

Name of the student: Borja Sanchez Zarate
Matriculation Num.: 350277

I hereby declare, in accordance with Section 18 para. 8 BPO 11, that I wrote the work independently, with no other but for examination purposes. No other than the specified sources or resources were used and as well as literal or analogous quotations have been marked as such.

Anchen 20th August 2015
Place, Date

Signature of the student